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Newfoundland East and Southeast Coast Herring - 1991 Assessment

by

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Abstract

Results of the analysis of data collected during 1991 are presented for the five herring stock complexes assessed within the Newfoundland region: 1) White Bay - Notre Dame Bay, 2) Bonavista Bay - Trinity Bay, 3) Conception Bay - Southern Shore, 4) St. Mary's Bay - Placentia Bay, and 5) Fortune Bay. Commercial landings increased from 8500 t in 1990 to 18200 t in 1991. The 1987 year-class of spring spawners replaced that of 1982 as the dominant year-class in the commercial fishery in the two northern stock areas where most of the landings (92%) occurred. Biomass estimates and projections are presented for St. Mary's Bay - Placentia Bay and Fortune Bay from an acoustic survey conducted during the winter of 1992. The research gillnet program was continued for the twelveth consecutive year. Research gillnet catch rates increased in all areas but one, due primarily to the recruitment of the 1987 year-class. With the exception of one area, there are indications that the 1987 year-class is not as large as the 1982 year-class which led to the rebuilding of these stocks. It was concluded that there have been no quantifiable changes in stock sizes since the last assessment of these stocks.

On présente ici l'analyse des données de 1991 portant sur les cinq zones de stock de hareng évaluées dans la région de Terre-Neuve, soit celles des baies 1) White-Notre Dame; 2) Bonavista-Trinity; 3) Conception et côte sud; 4) St. Mary's-Placentia et 5) Fortune. Les débarquements commerciaux sont passés de 8 500 t en 1990 à 18 200 t en 1991. La classe d'âge des géniteurs de printemps de 1987 a supplanté celle de 1982 comme classe dominante dans la pêche commerciale parmi les deux stocks du nord, d'où provenaient la plupart (92 p. 100) des débarquements. On présente aussi des estimations et des projections de la biomasse des baies St Mary's-Placentia et de la baie de Fortune fondées sur un relevé acoustique réalisé durant l'hiver 1992. Le programme de pêche expérimentale au filet maillant s'est poursuivi pour la douzième année de suite. Les taux de prises de cette pêche ont augmenté dans toutes les zones sauf une, en raison essentiellement du recrutement de la classe d'âge de 1987. Sauf dans une zone, il apparaît que la classe d'âge de 1987 n'est pas aussi abondante que celle de 1982, à laquelle on doit le rétablissement des stocks. On en a conclu qu'il n'y a pas eu de changement quantifiable dans la grosseur des stocks depuis leur dernière évaluation.

Introduction

Description of the 1991 Fishery

The 1991 herring management plan was essentially a roll-over of the 1990 plan, with an allowance (t) to fixed gear (gillnets and traps), and allocations (t) to bar seines and purse seines within each stock area, (Fig. 1), as follows:

Stock Area	Fixed Gear	Bar Seine	Purse Seine	Reserve
White Bay-Notre Dame Bay (WB-NDB)	2000	500 500	4000 4000	2500
Bonavista Bay-Trinity Bay (BB-TB)	2000	1000 1000	2000 2000	2000
Conception Bay-Southern Shore (CB-SS)	200	100 100	600	500
St. Mary's Bay-Placentia Bay (SMB-PB)	300	100 600	500	0
Fortune Bay (FB)	500	500	0	500
Labrador Coast	500	200	0	0
South Coast Newfoundland	500	100	0	0

Nominal Catches

TAC's and landings ($x10^3$ t) by stock area are listed below for 1984 to 1992:

		1984	1985	1986	1987	1988	1989	1990	1991	1992
WB-NDB	TAC	1.5	2.0	5.5	32.5	34.7	14.0	16.5	13.5	13.5
	Catch	1.5	1.8	2.8	13.5	7.4	6.4	4.5*	7.7*	-
BB-TB	TAC	0.4	0.8	3.8	13.7	16.2	6.9	23.0	10.0	10.0
	Catch	0.2	0.6	1.8	6.1	11.7	4.9	3.0*	8.9*	-
CB-SS	TAC	0.1	0.2	0.6	3.5	0.6	1.5	1.5	1.5	1.5
	Catch	<0.1	0.1	0.2	1.0	0.3	1.2	0.3*	0.4*	-
SMB-PB	TAC	0.0	0.6	2.1	2.5	8.9	1.5	1.5	1.5	1.5
	Catch	0.1	0.1	0.1	0.3	1.1	0.4	0.5*	1.0*	-
FB	TAC	0.0	0.3	0.7	2.4	4.7	1.5	1.5	1.5	1.5
	Catch	<0.1	0.1	0.1	0.1	0.1	0.1	0.1*	0.1*	-

* 1990 and 1991 catches are preliminary

Anecdotal Information

There was a renewed interest in the commercial herring fishery in the Newfoundland Region in 1991 due primarily to the poor inshore groundfish fishery. The federal and provincial governments administered a subsidy program in the fall of 1991 to increase the price paid to fishermen for herring. The program was designed to extend the fishing season both for fishermen and plant workers. Consequently, there were increased herring landings, in particular in the fall fishery in the two northern areas (Tables 1-3).

Similar to 1990 (Wheeler et al. 1991), there were again reports in 1991 of substantial mixing of small herring (primarily 1987 year-class) with schools of larger herring (>300 g) which are normally targeted by the commercial fishery. The increased proportion of 1987 year-class in the fall commercial catch was due both to the recruitment of this year-class and the fact that market requirements were more relaxed than usual as both fishermen and processors were more concerned with landing fish for the subsidy than with landing fish suitable for a particular market.

There was once again some interest in a winter fishery for herring in Placentia Bay (Table 4). In addition to the two purse seine vessels which have accounted for most of the landings there in recent years, several other purse seine vessels also fished in 1991. The TAC was not taken because the fixed gear allowance was not fully taken.

The Fortune Bay fishery (Table 5) was again restricted to a bait fishery only, as no purse seine vessels were licenced to fish there.

Due to unusally cold oceanographic conditions. spring spawning, in particular along the northeast coast, was delayed by four to six weeks.

Biological Sampling

There were 15,798 herring sampled in 1991 (Table 6) an increase of 7% from 1990. When apportioned by stock area, month, and gear type (Table 7), samples were available for 94% of the commercial catch. Samples were collected randomly; all fish sampled were measured and aged.

Mean weights at age for 1991 (Table 8) were derived from commercial and research samples of spring spawning herring collected from January to June.

Commercial Fishery Catch at Age

The 1987 year-class of spring spawners dominated (>40%) the fishery (by number) in the two northern stock areas where 92% of the total catch was taken (Tables 9 and 10, Fig. 2). In Conception Bay - Southern Shore, the 1987 and 1982 year-classes accounted for approximately equal proportions (30%) of the catch (Table 11, Fig. 2). In St. Mary's Bay - Placentia Bay (Table 12, Fig. 3), fish aged 11+ dominated (45%) and in Fortune Bay (Table 13, Fig. 3) the 1982 year-class continued to dominate (70%) the bait fishery.

The 1990 year-class accounted for approximately 8% of the commercial catch by number in White Bay - Notre Dame Bay. It is unusual for age 1 fish to be caught in the commercial fishery. The occurrence of this year-class is consistent with observations during the 1990 acoustic survey when only 1990 year-class herring were sampled in White Bay - Notre Dame Bay. (Wheeler, 1991).

Spring spawners continued to dominate in all areas. There was a substantial change only in Fortune Bay where spring spawners increased from 66% to 97%. This may be an artifact of sampling, as there were only 160 fish sampled from Fortune Bay.

Research Gillnet Program

1) Program Description

The program was continued for the twelveth year during the fall in the three northern areas, for the tenth year during the spring in the two southern areas, and for the seventh year during the spring in the three northern areas. There were no other changes to the database from last year (Wheeler et al. 1991). This will be the last year for the fall program as it has been eliminated due to a reduced operating budget.

2) Research Gillnet Catch at Age

Similar to the 1991 commercial catch, the 1987 year-class of spring spawners was more evident in the 1991 research gillnet catch. In the spring gillnet program (Figs. 4 and 5), it was dominant (by number) in White Bay - Notre Dame Bay and St. Mary's Bay - Placentia Bay and second to the 1982 year-class in Bonavista Bay - Trinity Bay. In the spring, the 1982 year-class

was dominant in those areas where the 1987 year-class was not.

In the fall program, (Fig. 6), the 1987 year-class was dominant in White Bay - Notre Dame Bay and Bonavista Bay - Trinity Bay. The 1982 year-class dominated in Conception Bay - Southern Shore. The same year-classes were evident in the fall catches in each area in 1990 and 1991.

The 1985 year-class of spring spawners, which accounted for greater than 10% of the spring and fall catch in Bonavista Bay - Trinity Bay and Conception Bay - Southern Shore in both 1989 and 1990, continued to do so again in 1991. Similarly, the 1986 year-class, which accounted for 10% to 15% of the catch in St. Mary's Bay - Placentia Bay in 1989 and 1990, accounted for approximately 25% of the catch in 1991.

Fish aged 11+ continued to account for greater than 10% of the catch in all areas in the spring and up to 25% of the catch in Conception Bay - Southern Shore and Fortune Bay. The dominance of the 1987 year-class in the two northern areas in the fall catches reduced the percentage of all other year-classes including fish aged 11+.

Spring spawners continued to dominate the catch in all areas in both the spring and fall. However, there were increased percentages of autumn spawners in the spring catches in both Conception Bay - Southern Shore and St. Mary' Bay - Placentia Bay.

3) Research Gillnet Catch Rates

Unstandardized catch rates have been presented in this analysis to examine temporal trends and relative year-class sizes.

Catch rates at age have been calculated by stock area, season, and spawning component from the unstandardized research gillnet catch rates and catch at age (Tables 14 -21). Catch rates increased from 1990 to 1991 in all areas in both the spring and fall except for St. Mary's Bay - Placentia Bay in the spring. In White Bay - Notre Dame Bay, in both the spring and fall, the increase was due primarily to the recruitment of the 1987 year-class. In other areas, the reason for the increase was not as clear. There has also been an increasing trend in catch rates over the past four years in both the spring and fall in each of the two northern stock areas. In other areas, there have been fluctuations but no obvious trends.

In relation to the 1982 year-class at age 4, the unstandardized catch rate of the 1987 year-class at age 4 was greater in White Bay - Notre Dame Bay, by a factor of 2.5. In other areas, the catch rate of the 1987 year-class at age 4 was from 0.17 to 0.50 that of the 1982 year-class at the same age. With the exception of White Bay - Notre Dame Bay, this is consistent with the conclusion reached last year that the 1987 year-class is weaker than that of 1982 (Wheeler et al. 1991).

Comparison of Acoustic and Research Gillnet Abundance Indices

Research gillnet catch rates, when averaged over multiple sites, are designed to provide annual estimates of herring density for the stock area. Similarly, acoustic abundance estimates can also be converted to stock density, simply by dividing by the area surveyed.

Biomass estimates were available for Bonavista Bay - Trinity Bay from an acoustic survey conducted in 1990 (Wheeler 1991) and for St. Mary's Bay - Placentia Bay and Fortune Bay from surveys in 1990 and 1992 (Wheeler 1991, 1992). In the following text table, acoustic biomass estimates have been converted to density estimates (tons/km^2) by dividing each by the area surveyed. These have been compared with stock density estimates as represented by spring research gillnet catch rates (catch numbers per days fished) for the same areas:

	Spring Gillnet Catch Rates			Acoustic Stock Density			Gillnet / Acoustic		
Year	BB-TB	SMB-PB	FB	BB-TB	SMB-PB	FB	BB-TB	SMB-PB	FB
1990	146	192	527	8.56	2.98	4.89	27.0	64.6	107.8
1991	318	87	781	-	-	-	-	-	-
1992	-	-	-	-	1.44	4.63	-	60.4	168.7

For Bonavista Bay - Trinity Bay, where the acoustic survey occurred in the fall, comparisons were made with the mean spring gillnet catch rates of 1990 and 1991.

Since gillnet catch rates should be directly proportional to stock density as measured by the acoustic survey, ratios should be similar when compared between stocks for standardized gears. However, for 1990, assuming that the acoustic estimate for Bonavista Bay - Trinity Bay is accurate, the gillnet catch rate index for St. Mary's Bay - Placentia Bay is 2.4 times higher than would be expected from the performance of similar gear in Bonavista Bay - Trinity Bay. Conversely, this implies that the 1990 acoustic survey biomass estimate in St. Mary's Bay - Placentia Bay was underestimated by a factor of 2.4. For Fortune Bay, the corresponding factor would be 4.0.

This analysis shows that there are large inconsistencies between acoustic survey estimates and research gillnet catch rates, in particular for Fortune Bay. Given the high densities reflected in the 1990 and 1991 research gillnet catch rates, the acoustic biomass estimates for both 1990 and 1992 may have substantial negative bias. However, since this analysis assumes that the acoustic survey estimate for Bonavista Bay - Trinity Bay is accurate (an assumption which is not necessarily true), the magnitude of this bias cannot yet be reliably quantified. Further analyses will be conducted within the next year to examine this problem.

Estimation of Stock Size and Assessment Results

Calculation of Stock Biomass from the Acoustic Survey

The following biomass estimates (t) were derived for St. Mary's Bay - Placentia Bay and Fortune Bay from the 1992 winter acoustic survey (Wheeler 1992). Biomass estimates from the 1990 acoustic surveys (Wheeler 1991) are provided for comparison:

	1990		1992	
Stock Area	Mean	C.V.	Mean	C.V.
SMB-PB	18,000	0.88	8,700	0.46
FB	7,700	0.69	7,300	0.85

All of the above biomass estimates were calculated using a 120 kHz target strength - fish length relationship derived from net enclosed herring (Wheeler 1991).

Coefficients of variation, based upon survey design only, are large for all areas due to the patchy distribution and relatively low biomass of fish within the survey area.

Prognosis

1. Catch Projections

Projections for 1993 were run for St. Mary's Bay - Placentia Bay and Fortune Bay based upon population numbers at age from the 1992 acoustic survey.

The following partial recruitment pattern, used in previous assessments (Wheeler et al. 1991) and based upon a combined purse seine and gillnet fishery was used for both stock areas:

Age	2	3	4	5	6	7	8	9	10	11+
P.R.	0.10	0.35	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Mean weights at age for 1992 and 1993 were derived from biological samples collected during January - June 1991 (Table 8). Recruitment at age 2 in 1992 and 1993 was derived from the 1992 acoustic survey population age structure.

Natural mortality was assumed to be 0.20. $F_{0.1}$ was assumed to be 0.30. Two options were run for each projection: 1) assuming that the 1992 catch equals the 1992 TAC, and 2) assuming that the 1992 catch equals the 1991 catch:

($x10^3$ t)	SMB-PB 1992	SMB-PB 1993	FB 1992	FB 1993
Option 1 2+ Biomass	6.9	6.1	7.0	5.0
Catch	1.5	1.1	1.5	1.1
Option 2 2+ Biomass	6.9	6.5	7.0	6.4
Catch	1.0	1.2	0.1	1.4

Given the very high coefficients of variation associated with the acoustic biomass estimates for St. Mary's Bay - Placentia Bay and Fortune Bay, there was no difference between the projected catch levels for 1993 and those recommended for 1992.

2. Management Implications and Conclusions

Biomass estimates were calculated for St. Mary's Bay - Placentia Bay and Fortune Bay from the 1992 acoustic survey. Projected catch levels for 1993 are similar to those recommended for 1992. However, there is a potential negative bias in these estimates given the preliminary analysis of inconsistencies between acoustic estimates and research gillnet catch rates.

Research gillnet catch rates have increased in most areas from 1990 to 1991 and have shown increasing trends over the past four years in the two northern stock areas, White Bay - Notre Dame Bay and Bonavista Bay - Trinity Bay, where most of the commercial fishery occurs. These increases have been due primarily to the recruitment of the 1987 year-class. However, with the exception of White Bay - Notre Dame Bay, there are indications that this year-class is not as large as the 1982 year-class which led to the rebuilding of these stocks.

There are also indications of young fish in most areas. The presence of the 1990 year-class in the commercial catch in White Bay - Notre Dame Bay is consistent with observations during the 1990 acoustic survey when only 1990 year-class fish were sampled in that area. However, it must also be noted that due to the subsidy program, the fishery in that area in 1991 may have been less discriminating regarding acceptable fish size. The 1990 and 1991 year-classes also contributed substantially to the population estimates from the 1992 acoustic survey of the two southern areas. Although these are positive signs, further evidence of the strength of these year-classes will be required before their impact on stock status can be assessed. It will be two or three years before these year-classes could contribute significantly to stock biomass.

Based upon the available information, it was concluded that stock sizes are at least stable and may be increasing. However, given the variability within the data, it was not possible to quantify any such changes. Therefore, since catch levels in recent years have not had any obvious negative impact on stock sizes, it would be prudent to maintain 1993 catch levels in all stock areas at 1992 TAC levels.

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Table 1. White Bay (W.B.)-Notre Dame Bay (N.D.B.) herring landings (t), by gear, 1976-91.

Year	Area	Gear						
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	Total
1976	W.B.	1724	487	-	18	509	246	2984
	N.D.B.	2908	3412	-	589	2242	353	9504
	Combined	4632	3899	-	607	2751	599	12488
1977	W.B.	-	1228	-	39	268	240	1775
	N.D.B.	-	4961	-	2096	2438	355	9850
	Combined	-	6189	-	2135	2706	595	11625
1978	W.B.	-	1254	-	240	1133	331	2958
	N.D.B.	-	3980	-	306	5859	311	10456
	Combined	-	5234	-	546	6992	642	13414
1979	W.B.	-	832	-	9	978	64	1883
	N.D.B.	-	1968	-	2274	8971	598	13811
	Combined	-	2800	-	2283	9949	662	15694
1980	W.B.	-	747	-	-	1269	83	2099
	N.D.B.	-	913	-	727	2778	13	4431
	Combined	-	1660	-	727	4047	96	6530
1981	W.B.	-	220	-	14	646	23	903
	N.D.B.	-	1065	-	400	2209	107	3781
	Combined	-	1285	-	414	2855	130	4684
1982	W.B.	-	-	-	7	402	52	461
	N.D.B.	-	-	-	136	1425	1	1562
	Combined	-	-	-	143	1827	53	2023
1983	W.B.	-	15	-	-	76	7	98
	N.D.B.	-	-	-	-	329	-	329
	Combined	-	15	-	-	406	7	427
1984	W.B.	-	-	-	4	342	4	350
	N.D.B.	-	-	-	3	1115	-	1118
	Combined	-	-	-	7	1457	4	1468
1985	W.B.	-	-	-	2	564	-	566
	N.D.B.	1	-	-	9	1248	-	1258
	Combined	1	-	-	11	1812	-	1824
1986	W.B.	112	-	-	1	196	7	316
	N.D.B.	1152	-	-	86	1119	83	2440
	Combined	1264	-	-	87	1315	90	2756
1987	W.B.	4283	-	-	37	396	-	4716
	N.D.B.	6570	-	-	530	1030	650	8780
	Combined	10,853	-	-	567	1426	650	13,496
1988	W.B.	1822	-	-	20	65	-	1907
	N.D.B.	4410	-	-	284	704	113	5511
	Combined	6232	-	-	304	769	113	7418
1989	W.B.	672	-	-	-	113	10	795
	N.D.B.	4372	-	-	45	976	206	5599
	Combined	5044	-	-	45	1089	216	6394
1990*	W.B.	217	-	-	1	88	21	327
	N.D.B.	2706	-	-	14	1317	143	4180
	Combined	2923	-	-	15	1405	164	4507
1991*	W.B.	1268	-	-	2	311	23	1604
	N.D.B.	5051	-	-	69	942	48	6110
	Combined	6319	-	-	71	1253	71	7714

* provisional

Table 2. Bonavista Bay (B.B.) - Trinity Bay (T.B.) herring landings (t), by gear, 1976-91.

Year	Area	Gear						Total
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	
1976	B.B.	2812	3052	-	24	328	139	6355
	T.B.	1614	1054	-	465	419	30	3582
	Combined	4426	4106	-	489	747	169	9937
1977	B.B.	-	6223	236	2495	309	-	9263
	T.B.	-	1548	-	927	174	45	2694
	Combined	-	7771	236	3422	483	45	11,957
1978	B.B.	-	4239	-	150	1320	3	5712
	T.B.	-	1055	-	966	308	8	2337
	Combined	-	5294	-	1116	1628	11	8049
1979	B.B.	-	3490	-	377	2374	4	6245
	T.B.	-	1181	-	1615	680	55	3531
	Combined	-	4671	-	1992	3054	59	9776
1980	B.B.	-	1714	-	652	1321	-	3687
	T.B.	-	964	-	405	336	13	1718
	Combined	-	2678	-	1057	1657	13	5405
1981	B.B.	-	1100	-	713	1399	7	3219
	T.B.	-	78	-	361	367	19	825
	Combined	-	1178	-	1074	1766	26	4044
1982	B.B.	-	-	-	-	386	4	390
	T.B.	-	-	-	25	76	6	107
	Combined	-	-	-	25	462	10	497
1983	B.B.	-	-	-	-	52	-	52
	T.B.	-	-	-	27	17	-	44
	Combined	-	-	-	27	69	-	96
1984	B.B.	-	-	-	-	135	-	135
	T.B.	-	-	-	-	41	-	41
	Combined	-	-	-	-	176	-	176
1985	B.B.	-	-	-	4	290	2	296
	T.B.	-	-	-	2	312	6	320
	Combined	-	-	-	6	602	8	616
1986	B.B	767	-	-	7	362	5	1141
	T.B.	356	-	-	30	233	5	624
	Combined	1123	-	-	37	595	10	1765
1987	B.B	4762	-	-	72	218	-	5052
	T.B.	838	-	-	15	175	1	1029
	Combined	5600	-	-	87	393	1	6081
1988	B.B.	7550	-	-	151	144	-	7845
	T.B.	3410	-	-	317	93	82	3902
	Combined	10960	-	-	468	237	82	11747
1989	B.B.	1459	-	-	13	92	-	1564
	T.B.	3149	-	-	141	65	6	3361
	Combined	4608	-	-	154	139	6	4925
1990*	B.B.	729	-	-	19	108	7	863
	T.B.	1319	-	-	715	80	30	2144
	Combined	2048	-	-	734	188	37	3007
1991*	B.B.	4348	-	-	7	147	43	4545
	T.B.	3724	-	-	552	85	-	4361
	Combined	8072	-	-	559	232	43	8906

* provisional

Table 3. Conception Bay (C.B.)- Southern Shore (S.S.) herring landings (t), by gear, 1976-91.

Year	Area	Gear						Total
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	
1976	C.B.	-	1704	258	76	153	92	2283
	S.S.	-	44	-	-	8	149	201
	Combined	-	1748	258	76	161	241	2484
1977	C.B.	-	1248	-	58	174	12	1492
	S.S.	-	442	-	-	18	200	660
	Combined	-	1690	-	58	192	212	2152
1978	C.B.	-	1098	-	11	415	3	1527
	S.S.	-	133	-	14	78	193	418
	Combined	-	1231	-	25	493	196	1945
1979	C.B.	-	432	-	-	210	63	705
	S.S.	-	10	-	18	49	111	188
	Combined	-	442	-	18	259	174	893
1980	C.B.	-	319	-	16	107	1	443
	S.S.	-	-	-	-	2	32	34
	Combined	-	319	-	16	109	33	477
1981	C.B.	-	-	-	-	160	2	162
	S.S.	-	-	-	-	53	8	61
	Combined	-	-	-	-	213	10	223
1982	C.B.	-	-	-	-	84	1	85
	S.S.	-	-	-	-	7	5	12
	Combined	-	-	-	-	91	6	97
1983	C.B.	-	-	-	-	17	-	17
	S.S.	-	-	-	-	-	-	-
	Combined	-	-	-	-	17	-	17
1984	C.B.	-	-	-	-	49	-	49
	S.S.	-	-	-	-	-	-	-
	Combined	-	-	-	-	49	-	49
1985	C.B.	-	-	-	-	81	-	81
	S.S.	-	-	-	-	16	-	16
	Combined	-	-	-	-	97	-	97
1986	C.B.	76	-	-	-	102	1	179
	S.S.	-	-	-	1	23	1	25
	Combined	76	-	-	1	125	2	204
1987	C.B.	580	-	-	187	185	10	962
	S.S.	-	-	-	-	15	3	18
	Combined	580	-	-	187	200	13	980
1988	C.B.	197	-	-	1	36	1	235
	S.S.	1	-	-	-	7	73	81
	Combined	198	-	-	1	43	74	316
1989	C.B.	1167	-	-	-	69	-	1236
	S.S.	-	-	-	-	9	1	10
	Combined	1167	-	-	-	78	1	1246
1990*	C.B.	261	-	-	-	53	-	314
	S.S.	-	-	-	-	12	-	12
	Combined	261	-	-	-	65	-	326
1991*	C.B.	397	-	-	-	18	-	415
	S.S.	8	-	-	-	7	1	16
	Combined	405	-	-	-	25	1	431

* provisional

Table 4. St. Mary's Bay (SMB)-Placentia Bay (PB) herring landings (t), by gear, 1976-91.

Year	Area	Gear					
		Purse seine	Ringnet	Bar seine	Gillnet	Trap	Total
1976	S.M.B.	-	920	158	352	25	1455
	P.B.	2056	172	242	177	-	2647
	Combined	2056	1092	400	529	25	4102
1977	S.M.B.	-	1131	221	531	29	1912
	P.B.	740	524	14	78	-	1356
	Combined	740	1655	235	609	29	3268
1978	S.M.B.	-	1523	66	490	3	2082
	P.B.	557	612	29	214	33	1445
	Combined	557	2135	95	704	36	3527
1979	S.M.B.	-	1570	131	332	9	2042
	P.B.	359	91	17	307	1	1575
	Combined	359	2461	148	639	10	3617
1980	S.M.B.	-	645	16	352	12	1025
	P.B.	182	892	9	339	30	1452
	Combined	182	1537	25	691	42	2477
1981	S.M.B.	-	44	8	122	-	174
	P.B.	-	311	-	149	1	461
	Combined	-	355	8	271	1	635
1982	S.M.B.	-	-	-	10	-	10
	P.B.	-	-	4	31	-	35
	Combined	-	-	4	41	-	45
1983	S.M.B.	-	-	-	13	-	13
	P.B.	-	-	-	27	-	27
	Combined	-	-	-	40	-	40
1984	S.M.B.	-	-	-	11	-	11
	P.B.	-	-	1	95	-	96
	Combined	-	-	1	106	-	107
1985	S.M.B.	-	-	1	31	-	32
	P.B.	3	-	-	113	-	116
	Combined	3	-	1	144	-	148
1986	S.M.B.	4	-	-	17	-	21
	P.B.	-	-	2	107	-	109
	Combined	4	-	2	124	-	130
1987	S.M.B.	33	-	5	47	5	90
	P.B.	-	-	1	161	-	162
	Combined	33	-	6	208	5	252
1988	S.M.B.	-	-	-	25	-	25
	P.B.	887	-	12	176	-	1075
	Combined	887	-	12	201	-	1100
1989	S.M.B.	-	-	-	8	-	8
	P.B.	263	-	1	131	2	397
	Combined	263	-	1	139	2	405
1990*	S.M.B.	-	-	-	18	-	18
	P.B.	379	-	-	144	-	523
	Combined	379	-	-	162	-	541
1991*	S.M.B.	-	-	-	15	-	15
	P.B.	723	-	110	104	34	971
	Combined	723	-	110	119	34	986

* provisional

Table 5. Fortune Bay herring landings (t), by gear, 1975-91.

Year	Gear				Total
	Purse seine	Bar seine	Gillnet	Trap	
1975	809	81	19	-	909
1976	109	310	43	-	462
1977	188	364	22	5	579
1978	104	854	41	-	999
1979	285	829	81	-	1195
1980	97	265	89	-	451
1981	-	30	37	-	67
1982	-	-	20	2	22
1983	-	-	15	-	15
1984	-	-	21	-	21
1985	-	-	52	-	52
1986	1	1	92	-	94
1987	-	2	144	-	146
1988	-	-	89	-	89
1989	-	3	104	2	109
1990*	-	-	92	-	92
1991*	-	-	123	-	123

* provisional

Table 6. Number of fish sampled from the Newfoundland herring fishery, by area and gear, 1986-91 (research samples in parenthesis).

Year	Area	Gear type: Trap	Bar seine	Gillnet	Ringnet	Midwater trawl	Total sampled	Comm. catch (t)
1986	WB	-	-	(1150)	100		100 (1150)	316
	NDB	77	50	600 (1222)	50 (400)		777 (1622)	2440
	BB	150	-	400 (1949)	389 (150)		939 (2099)	1141
	TB	150	100	400 (800)	150 (700)		800 (1500)	624
	CB	150 (236)	-	344 (1010)	(100)		494 (1346)	179
	SS	-	-	(579)	-		(579)	25
	SMB	50	-	100 (850)	150		300 (850)	21
	PB	50	-	582 (558)	(350)		632 (908)	109
	FB	-	-	286 (1338)	(100)		286 (1438)	94
	Total	627 (236)	150	2712 (9456)	839 (1800)		4328 (11492)	4949
1987	WB	-	-	350 (850)	246		596 (850)	4716
	NDB	250	-	300 (1174)	583 (313)		1133 (1487)	8780
	BB	50	-	265 (1592)	546 (169)		861 (1761)	5052
	TB	-	100	196 (1100)	386 (50)		682 (1150)	1029
	CB	50 (200)	-	150 (500)	200		400 (700)	962
	SS	50	-	95 (250)	-		145 (250)	18
	SMB	-	50 (200)	50 (800)	50		150 (1000)	90
	PB	-	-	200 (786)	-		200 (786)	162
	FB	-	-	191 (1300)	-		191 (1300)	146
	Total	400 (200)	150 (200)	1797 (8352)	2011 (532)		4358 (9284)	20955
1988	WB	-	-	50 (1229)	200		250 (1229)	1907
	NDB	46	-	349 (1817)	300 (600)		695 (2417)	5511
	BB	-	-	297 (2320)	400		697 (2320)	7845
	TB	100	100	200 (1100)	300		700 (1100)	3902
	CB	50	-	178 (1213)	141		369 (1213)	235
	SS	94	-	- (377)	-		94 (377)	81
	SMB	-	-	98 (731)	48		146 (731)	25
	PB	-	-	134 (846)	136		270 (846)	1075
	FB	-	-	194 (1246)	-		194 (1246	90
	Total	290	100	1500 (10879)	1525 (600)		3415 (11479)	20671
1989	WB	-	-	133 (1742)	100		233 (1742)	795
	NDB	50	-	196 (2562)	300		546 (2562)	5599
	BB	-	-	148 (1995)	150		298 (1995)	1564
	TB	100 (100)	50	200 (1817)	200 (100)		550 (2017)	3361
	CB	-	-	204 (1044)	150		354 (1044)	1236
	SS	-	-	99 (342)	-		99 (342)	10
	SMB	-	-	100 (687)	-		100 (687)	8
	PB	-	-	100 (794)	200		300 (794)	397
	FB	-	-	237 (1226)	-		237 (1226)	109
	Total	150 (100)	50	1417 (12209)	1100 (100)		2717 (12409)	13079
1990	WB	-	-	127 (1355)	50 (200)	(79)	177 (1634)	326
	NDB	-	50	250 (1889)	350 (200)	(224)	659 (2313)	4180
	BB	-	-	100 (1277)	400 (100)	(50)	500 (1427)	862
	TB	-	100 (568)	150 (1610)	200 (36)	(6)	450 (2220)	2144
	CB	-	-	44 (1223)	99	-	143 (1223)	314
	SS	-	-	37 (192)	-	-	37 (192)	12
	SMB	-	-	50 (747)	-	-	50 (747)	18
	PB	-	-	87 (698)	171 (71)	200	258 (969)	524
	FB	-	-	90 (1283)	(200)	149	90 (1632)	93
1991	WB	- (50)	-	100 (1853)	150	-	250 (1903)	1604
	NDB	-	-	200 (2084)	350	-	550 (2084)	6110
	BB	100	-	100 (2264)	400	(10)**	600 (2274)	4545
	TB	-	150	150 (2533)	417	-	717 (2533)	4361
	CB	- (50)	-	98 (1454)	100	-	198 (1504)	431
	SS	48	-	- (190)	-	-	48 (190)	16
	SMB	-	-	50 (724)	-	-	50 (724)	15
	PB	-	-	139 (448)	191	-	330 (448)	971
	FB	-	-	162 (1233)	-	-	162 (1233)	123
TOTAL		148 (100)	-	999 (12783)	1608	(10)**	2905 (12893)	18176

* 1990-91 catches are provisional

** handline (feather hooks)

Table 7. Commercial catch (t) and sampling (number of fish) for 1991, by stock area, month, and gear type.

		WB-NDB		BB-TB		CB-SS		SMB-PB		FB	
Month	Gear	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled
January	Gillnet	1	-	-	-	-	-	2	-	-	50
	Purse seine	-	-	1201	172	-	-	-	48	-	-
February	Gillnet	-	-	-	-	-	-	1	-	1	50
	Purse seine	-	-	-	-	-	-	261	46	-	-
March	Gillnet	-	-	1	-	-	-	7	89	4	-
	Purse seine	-	-	182	46	-	-	260	47	-	-
April	Gillnet	4	-	8	50	-	50	29	50	30	42
	Purse seine	-	-	1398	99	-	-	201	50	-	-
	Bar seine	-	-	48	50	-	-	-	-	-	-
May	Gillnet	263	50	92	100	6	-	43	50	54	20
	Purse seine	38	50	1014	100	5	-	34	-	-	-
	Bar seine	25	-	154	50	-	-	110	-	-	-
	Trap	1	-	42	50	-	-	1	-	-	-
June	Gillnet	480	100	57	-	3	-	32	-	31	-
	Purse seine	-	-	123	50	-	50	-	-	-	-
	Bar seine	-	-	342	50	-	-	-	-	-	-
July	Gillnet	152	50	20	-	4	48	1	-	1	-
	Purse seine	1	-	-	-	-	-	-	-	-	-
	Trap	-	-	-	-	1	48	-	-	-	-
August	Gillnet	3	-	-	-	1	-	1	-	1	-
	Trap	-	-	-	-	1	-	-	-	-	-
September	Gillnet	17	-	4	50	2	-	1	-	1	-
	Purse seine	14	-	5	-	-	-	-	-	-	-
	Bar seine	20	-	16	-	-	-	-	-	-	-
	Trap	12	-	-	-	-	-	-	-	-	-
October	Gillnet	204	100	33	50	7	-	1	-	-	-
	Purse seine	2124	200	2026	150	25	-	-	-	-	-
	Bar seine	-	-	1	-	-	-	-	-	-	-
	Trap	31	-	-	50	-	-	-	-	-	-
November	Gillnet	124	-	14	-	2	-	1	-	-	-
	Purse seine	3806	200	1473	100	199	50	-	-	-	-
	Bar seine	25	-	-	-	-	-	-	-	-	-
	Trap	16	-	1	-	-	-	-	-	-	-
December	Gillnet	5	-	3	-	-	-	1	-	1	-
	Purse seine	335	50	635	100	174	-	-	-	-	-
	Bar seine	-	-	-	-	-	-	-	-	-	-
	Trap	12	-	-	-	-	-	-	-	-	-
Combined	Gillnet	1253	300	232	250	25	98	120	189	124	162
	Purse seine	6318	500	8057	817	403	100	756	191	-	-
	Bar seine	70	-	561	150	-	-	110	-	-	-
	Trap	72	-	43	100	2	48	1	-	-	-
TOTAL		7713	800	8893	1317	430	246	987	380	124	162

Table 8. Mean weight at age (g) of Newfoundland spring spawning herring from samples collected January-June, 1991. Sample sizes in parenthesis.

	Stock area				
Age	WB-NDB	BB-TB	CB-SS	SMB-PB	FB
0	-	-	-	-	-
1	-	-	-	-	-
2	-	-	54 (1)	77 (4)	-
3	122 (16)	132 (15)	137 (2)	140 (22)	134 (2)
4	172 (665)	202 (670)	235 (133)	212 (271)	186 (143)
5	212 (77)	257 (188)	269 (48)	258 (103)	233 (53)
6	247 (44)	287 (484)	286 (91)	278 (45)	244 (7)
7	278 (29)	286 (54)	311 (12)	298 (13)	276 (5)
8	287 (214)	289 (287)	296 (46)	302 (30)	289 (54)
9	312 (405)	322 (1053)	321 (289)	331 (233)	319 (672)
10	331 (37)	339 (65)	345 (18)	346 (26)	338 (63)
11+	393 (236)	387 (140)	388 (65)	362 (189)	372 (284)

Table 9. Commercial catch at age of spring and autumn spawning herring for White Bay-Notre Dame Bay, 1970-91.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	10	1	5	1	1	2	56	50	1	1	115
	3	1	129	290	727	4	128	24	1671	55	60	46
	4	12	88	2396	1411	123	215	506	107	2034	50	1240
	5	24	161	353	2825	3142	453	237	468	317	2928	92
	6	24	64	69	761	5446	5438	868	184	1034	323	1080
	7	972	425	122	719	1193	7069	10893	793	517	1410	17
	8	11	10184	403	654	697	1123	17145	7363	2509	767	496
	9	83	233	1363	416	1506	838	1328	12675	10807	2222	179
	10	159	254	205	1685	858	810	3364	1055	11756	14413	1450
	11+	275	3105	808	794	2378	3999	8535	15707	14379	27508	14653
Total SS		1572	14645	6015	9995	15349	20076	42957	40074	43410	49683	19369
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	53	1	1	6	1	1	1	1	71
	4	1	1	17	7	11	64	31	45	6	1	13
	5	26	6	74	22	124	3	35	35	24	10	13
	6	10	14	79	25	10	25	51	85	155	267	23
	7	39	11	67	60	48	16	20	54	171	172	272
	8	60	26	1	25	2	21	40	1	24	160	4
	9	20	17	164	13	46	3	46	94	2	133	19
	10	11	19	81	97	7	2	4	1	130	1	1
	11+	172	291	562	298	346	302	329	182	238	298	450
Total AS		342	388	1100	550	597	444	559	500	753	1045	868
Total AS & SS		1914	15033	7115	10545	15946	20520	43516	40572	44163	50728	20237
% SS		82.1	97.4	84.5	94.8	96.3	97.8	98.7	98.8	98.3	97.9	95.7
% AS		17.9	2.6	15.5	5.2	3.7	2.2	1.3	1.2	1.7	2.1	4.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	1991*
Spring	1	1	1	1	1	1	195	26	3113	1	1	2273
spawners	2	445	76	1	6	3	29	1105	407	23	1	28
	3	152	371	38	12	187	975	324	1044	128	1559	375
	4	41	332	46	124	350	2945	7201	291	613	233	15518
	5	1231	59	23	1218	240	308	25843	2984	124	558	1458
	6	63	268	14	73	1486	667	1651	11819	3106	213	498
	7	805	34	93	114	108	1258	1067	1036	10566	2324	102
	8	64	258	1	157	275	198	2088	1137	370	6574	1785
	9	344	19	26	37	94	162	399	1454	1081	458	3417
	10	194	192	4	122	81	179	442	315	844	1015	445
	11+	10908	4059	805	1938	2110	1973	4566	2943	2178	1041	2049
Total SS		14248	5669	1052	3802	4935	8888	44712[a]	26543[b]	19034	13977	27948
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	72	1	1	1	10	2	1	1	1	1
	4	13	26	74	60	29	67	297	92	65	100	165
	5	86	62	25	409	94	69	469	115	12	59	443
	6	11	16	23	66	333	79	156	45	5	43	95
	7	1	12	1	30	137	373	112	20	574	86	36
	8	100	9	1	8	32	68	630	7	70	4	121
	9	1	42	6	7	23	6	152	560	1	1	239
	10	4	1	1	3	10	1	10	6	533	4	79
	11+	65	23	1	24	74	42	108	306	29	446	2419
Total AS		284	265	135	610	735	713	1935	1154	1292	746	3600
Total AS & SS		14532	5934	1187	4412	5670	9601	46647	27607	20326	14723	31548
% SS		98.0	95.5	88.6	86.2	87.0	92.6	95.9	95.8	93.6	94.9	88.6
% AS		2.0	4.5	11.4	13.8	13.0	7.4	4.1	4.2	6.4	5.1	11.4

* preliminary

[a] 4475 age 0's in 1987 SS not included

[b] 10 age 0's in 1988 SS not included

Table 10. Commercial catch at age of spring and autumn spawning herring for Bonavista Bay-Trinity Bay, 1970-91.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	5	10	1	1	1
spawners	2	1	1	1	1	1	1	14	16	22	6	15
	3	1	690	10	1	1	392	77	248	26	286	13
	4	1	311	1347	60	2	134	493	135	357	167	195
	5	9	102	389	4887	235	163	123	759	122	765	43
	6	55	64	91	126	4795	2564	166	227	251	19	293
	7	808	361	75	96	424	14330	4897	50	112	436	52
	8	35	1373	88	1	151	455	20697	6209	598	101	264
	9	126	151	480	48	294	995	909	23206	4412	530	75
	10	69	126	14	271	69	727	854	774	13394	5575	967
	11+	212	522	213	1	1849	1679	4306	5890	5956	19994	12259
Total SS		1318	3702	2709	5488	7822	21441	32539	37524	25251	27880	14177
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	1	10	1	1	1	14
	4	9	1	1	1	1	26	22	55	16	1	11
	5	1	10	1	1	1	30	77	16	14	27	17
	6	1	1	1	1	1	1	23	176	61	114	83
	7	4	4	2	1	16	22	66	86	58	30	188
	8	17	23	2	48	2	41	34	112	28	175	45
	9	18	3	5	1	1	6	62	30	23	13	112
	10	17	21	1	1	1	19	8	73	82	16	3
	11+	738	406	33	1	1216	259	1069	1069	417	800	463
Total AS		808	472	49	58	1242	407	1373	1620	702	1179	938
Total AS & SS		2126	4174	2758	5546	9064	21848	33912	39114	25953	29059	15115
% SS		62.0	88.7	98.2	99.0	86.3	98.1	96.0	95.9	97.3	95.9	93.8
% AS		38.0	11.3	1.8	1.0	13.7	1.9	4.0	4.1	2.7	4.1	6.2

	Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	1991*
Spring	1	1	1	1	1	1	151	296	717	1	1	112
spawners	2	136	1	1	4	13	207	1352	6612	563	48	671
	3	246	8	4	22	175	443	413	9910	1043	2617	205
	4	53	11	34	35	70	4445	2845	267	3323	361	13245
	5	256	2	7	210	87	261	16208	3674	264	1991	2527
	6	26	30	2	9	351	161	334	21739	1428	65	3812
	7	288	5	15	5	37	262	359	782	8639	542	341
	8	23	35	1	12	27	38	126	713	13	3752	1527
	9	321	5	8	2	13	10	33	8	216	134	7382
	10	88	65	2	2	22	31	6	55	100	234	442
	11+	11762	1186	159	154	797	657	956	1247	508	379	879
Total SS		13200	1349	234	456	1593[a]	6665	22928[b]	45724	16098	10124	31146
Autumn	1	1	1	1	1	1	1	19	1		1	1
spawners	2	1	1	1	1	1	1	1	253	1	1	1
	3	6	3	1	1	1	1	1	54	1	5	6
	4	115	1	10	3	5	51	2	22	55	110	138
	5	106	8	2	84	18	80	391	88	76	44	820
	6	33	10	5	14	203	59	237	357	136	5	150
	7	83	3	2	17	96	292	87	216	237	52	17
	8	283	8	1	3	54	149	360	202	18	43	98
	9	36	25	1	5	22	24	138	818	83	49	104
	10	4	1	1	1	10	1	2	2	697	17	122
	11+	230	37	3	9	29	30	156	237	193	68	476
Total AS		898	98	28	139	440	686	1391	2250	1498	395	1933
Total AS & SS		14098	1447	262	595	2033	7351	24319	47974	10982	10519	33079
% SS		93.6	93.2	89.3	76.6	78.4	90.7	94.3	95.3	91.5	96.2	94.2
% AS		6.4	6.8	10.7	23.4	21.6	9.3	5.7	4.7	8.5	3.8	5.8

* preliminary
[a] 10 age 0's in 1985 SS not included
[b] 3124 age 0's in 1987 SS not included

Table 11. Commercial catch at age of spring and autumn spawning herring for Conception Bay-Southern Shore, 1970-91.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	67	4	9	1177	7	1	1	1
	3	1	36	7	2	1	418	28	127	1	4	1
	4	15	31	1625	34	5	30	97	5	99	9	3
	5	17	19	134	4521	122	16	23	101	32	34	1
	6	21	11	55	242	9655	2057	31	45	65	7	19
	7	255	43	29	329	153	8592	2330	13	14	38	1
	8	12	272	79	142	83	120	4771	950	3	4	12
	9	13	26	361	44	39	517	89	4241	734	31	1
	10	11	11	67	175	13	238	252	49	3080	270	49
	11+	46	65	122	28	658	891	714	959	1358	1640	1101
Total SS		393	516	2481	5585	10734	12889	9513	6498	5388	2039	1190
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	2	7	1	1	1	1	1
	4	1	1	1	2	3	162	1	7	4	2	1
	5	1	1	1	2	8	40	49	29	50	17	1
	6	8	1	1	1	6	81	27	150	30	80	1
	7	20	1	1	38	17	18	23	87	69	15	32
	8	36	6	1	35	1	49	23	72	9	57	3
	9	5	34	1	1	6	11	31	13	10	17	6
	10	6	11	1	1	1	14	12	7	34	6	1
	11+	114	89	1	94	45	318	193	373	282	245	32
Total AS		194	147	11	177	91	702	362	741	491	442	80
Total AS & SS		587	663	2492	5762	10825	13591	9875	7239	5879	2481	1270
% SS		67.0	77.8	99.6	96.9	99.2	94.8	93.6	89.8	91.6	82.2	93.7
% AS		33.0	22.2	0.4	3.1	0.8	5.2	3.7	10.2	8.4	17.8	6.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	1991*
Spring	1	1	1	1	1	1	1	714	22	1	1	1
spawners	2	1	1	1	1	1	6	1	2	718	1	1
	3	25	2	1	3	58	1	36	87	833	87	1
	4	4	5	1	27	11	389	73	25	1319	36	316
	5	26	1	1	47	11	7	3486	252	15	49	73
	6	9	2	1	5	17	13	17	502	123	1	222
	7	28	1	1	1	2	16	26	33	1696	57	24
	8	3	5	1	2	2	3	10	5	10	434	4
	9	14	1	1	1	1	1	2	1	37	18	369
	10	13	1	1	1	1	3	1	1	2	24	49
	11+	504	176	13	7	97	81	65	45	138	81	59
Total SS		628	196	23	96	202	518	4431	975	4892	789	1119
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	9	1	1	1	23	1	1	365	1	1
	4	14	5	1	4	3	7	7	1	1	3	73
	5	8	14	2	60	6	18	37	49	1	10	26
	6	3	1	3	6	52	21	27	96	3	4	25
	7	7	1	1	6	24	94	32	90	67	2	3
	8	14	2	2	3	13	29	32	39	13	2	1
	9	2	2	5	1	3	10	21	42	5	15	4
	10	1	1	1	1	1	3	13	1	31	18	6
	11+	9	5	12	1	15	10	8	1	15	89	14
Total AS		61	42	30	85	120	214	175	322	503	146	155
Total AS & SS		689	238	53	181	322	732	6114	1297	5395	935	1274
% SS		91.1	82.4	43.4	53.0	62.7	70.8	96.2	75.2	90.7	84.4	87.8
% AS		8.9	17.6	56.6	47.0	37.3	29.2	3.8	24.8	9.3	15.6	12.2

* preliminary

Table 12. Commercial catch at age of spring and autumn spawning herring for St. Mary's Bay-Placentia Bay, 1970-91.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	3	1	1	1	3	1	1	1	1	1	1
spawners	2	476	1	1	76	995	74	365	52	30	87	133
	3	109	557	207	326	280	2234	391	1423	175	663	332
	4	4434	116	20375	77	234	471	1906	140	1817	279	133
	5	59	2111	725	15470	126	147	208	736	123	2263	153
	6	76	80	5154	566	14328	1591	267	87	596	96	1270
	7	645	251	365	6757	436	13858	862	50	64	614	57
	8	66	45	650	93	6049	146	5622	1039	106	85	470
	9	72	13	352	224	138	3391	201	3830	512	66	38
	10	37	22	73	193	238	350	2256	134	3827	501	237
	11+	107	96	403	315	624	1323	1361	2448	2185	4785	2971
Total SS		6084	3293	28306	24098	23451	23586	13440	9940	9436	9440	5795
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	24	5	2	1	11	1	1	1	1
	4	1	9	61	150	2	7	4	47	23	11	96
	5	2	2	175	52	96	68	214	52	435	143	35
	6	1	53	15	71	146	182	67	209	92	598	52
	7	71	31	61	10	80	89	32	81	244	73	419
	8	112	43	37	54	95	206	17	69	122	216	79
	9	19	84	101	17	93	6	94	26	38	21	126
	10	28	35	71	68	51	37	11	22	52	2	25
	11+	202	314	539	737	970	677	329	526	561	348	492
Total AS		439	574	1086	1166	1537	1275	781	1035	1570	1415	1327
Total AS & SS		6523	3867	29392	25264	24988	24861	14221	10975	11006	10855	7122
% SS		93.3	85.2	96.3	95.4	93.8	94.9	94.5	90.6	85.7	87.0	81.4
% AS		6.7	14.8	3.7	4.6	6.2	5.1	5.5	9.4	14.3	13.0	18.6

	Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	1991*
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	8	1	1	34	1	22	1	36
	3	193	1	5	9	7	1	19	1	48	115	1
	4	42	2	2	24	18	143	2	22	9	189	220
	5	111	3	3	36	27	19	502	163	1	64	160
	6	51	8	2	6	21	28	29	2457	24	15	166
	7	338	3	4	3	15	9	47	119	463	30	12
	8	28	14	1	24	3	4	9	213	34	494	108
	9	80	4	9	1	25	1	3	16	100	45	482
	10	6	4	1	10	5	5	1	36	5	172	86
	11+	466	69	39	44	125	30	11	147	34	128	930
Total SS		1317	110	68	166	248	238	656	3176	741	1254	2202
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	2	1	1	1	1
	3	1	1	1	1	1	1	4	1	5	7	1
	4	139	1	18	17	9	16	12	20	5	37	13
	5	116	7	6	101	20	24	32	30	18	61	83
	6	10	1	12	32	86	15	80	239	8	54	42
	7	11	1	4	21	46	97	30	90	56	24	22
	8	50	1	1	5	36	28	82	35	43	47	65
	9	7	1	1	3	10	16	24	270	67	58	98
	10	1	1	1	1	3	4	3	5	178	17	39
	11+	29	2	4	8	24	15	12	53	164	173	483
Total AS		366	18	50	191	237	215	281	745	546	480	848
Total AS & SS		1683	128	118	357	485	453	937	3921	1287	1734	3050
% SS		78.3	85.9	57.6	46.5	51.1	52.5	70.0	81.0	57.6	72.3	72.2
% AS		21.7	14.1	42.4	53.5	48.9	47.5	30.0	19.0	42.4	27.7	27.8

* preliminary

Table 13. Commercial catch at age of spring and autumn spawning herring for Fortune Bay, 1970-91.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	617	23	1	1	1	1	1	1	1
spawners	2	29475	167	1515	2210	389	2	82	27	1	1	25
	3	5988	23223	256	925	1314	277	15	2103	42	1	16
	4	11953	6086	19690	67	552	581	318	25	2677	183	3
	5	133	23525	2896	5694	130	112	228	327	62	3833	69
	6	281	1165	10767	475	4435	87	129	166	237	15	1122
	7	7894	5747	351	1712	250	1490	11	26	43	165	7
	8	233	3514	4432	73	1094	16	338	43	139	5	183
	9	16	132	991	282	36	142	36	188	52	24	1
	10	225	148	34	558	117	22	188	4	326	1	11
	11+	257	537	366	173	255	201	140	244	302	167	50
Total SS		56456	64245	41915	12192	8573	2931	1486	3154	3882	4396	1488
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	7	1	7	1	1	1	1
	4	1	598	1	48	9	22	9	23	1	7	4
	5	334	1	84	50	87	12	38	19	36	5	3
	6	1	136	25	79	65	39	26	19	6	50	3
	7	443	175	185	8	12	19	13	1	25	1	3
	8	816	769	44	32	27	20	1	1	12	17	1
	9	412	626	310	15	5	11	27	1	6	12	1
	10	1	470	125	27	1	7	1	1	1	1	1
	11+	2201	1956	793	97	85	45	9	2	18	12	1
Total AS		4212	4734	1570	359	300	178	133	70	108	108	20
Total AS & SS		60668	68979	43485	12551	8873	3109	1619	3224	3990	4504	1508
% SS		93.1	93.1	96.4	97.1	96.6	94.3	91.8	97.8	97.3	97.6	98.7
% AS		6.9	6.9	3.6	2.9	3.4	5.7	8.2	2.2	2.7	2.4	1.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*	1991*
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	2	1	1	1	1	1	1	1
	3	144	1	2	1	54	1	1	1	1	1	1
	4	16	3	2	4	3	145	1	1	1	1	23
	5	4	3	1	3	39	4	304	1	1	2	8
	6	3	1	1	2	12	69	11	219	18	2	1
	7	21	2	1	1	2	20	49	7	274	12	1
	8	2	36	1	2	1	6	18	26	1	155	6
	9	23	1	10	1	1	1	4	6	17	17	274
	10	1	5	1	2	1	2	1	1	11	20	1
	11+	12	5	18	23	15	14	38	10	24	1	72
Total SS		228	59	39	42	130	264	429	274	350	213	389
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	5	1	1	1	1	1	1	1	1	1	1
	4	64	1	1	1	17	3	1	2	3	10	1
	5	16	7	1	9	4	8	4	1	6	5	1
	6	1	2	2	4	26	16	7	5	1	12	8
	7	1	1	1	6	12	38	11	5	6	17	1
	8	1	1	1	1	7	12	25	1	31	7	3
	9	1	1	1	1	4	5	10	13	3	54	1
	10	1	1	1	1	1	1	5	1	17	1	3
	11+	1	1	1	1	2	5	14	10	5	5	1
Total AS		93	18	12	27	76	91	80	41	75	114	22
Total AS & SS		321	77	51	69	206	355	509	315	425	327	411
% SS		71.0	76.6	76.5	60.9	63.1	74.4	84.3	87.0	82.4	65.1	94.6
% AS		29.0	23.4	23.5	39.1	36.9	25.6	15.7	13.0	17.6	34.9	5.4

* preliminary

Table 14. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, for White Bay - Notre Dame Bay, spring program.

Stock: WBNDB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1971	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.1	0.0	0.0
4	0.0	0.0	0.0	2.5	2.7
5	0.0	0.8	7.4	2.7	4.4
6	2.2	1.4	2.0	2.5	2.3
7	0.0	0.8	4.8	0.9	2.7
8	3.9	0.7	4.8	1.5	1.7
9	1.9	4.8	6.9	2.1	4.8
10	0.0	0.1	21.7	0.2	0.0
11	41.8	1.5	18.6	17.5	22.6
Total	49.8	10.1	66.4	29.2	41.2

SPRING SPAWNERS

Age	1971	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0
3	0.0	5.0	17.5	91.0	18.2
4	24.9	2.0	47.1	56.2	410.0
5	3.9	23.9	12.2	57.7	47.7
6	22.3	63.9	138.3	17.8	22.7
7	27.5	6.0	199.2	157.6	12.5
8	1010.9	5.0	10.6	213.1	139.7
9	14.4	12.9	17.5	12.6	272.5
10	28.8	1.9	26.5	28.9	36.3
11	176.8	36.6	61.4	105.8	176.0
Total	1309.5	157.0	529.7	740.1	1135.6

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1988	1989	1989	1991
1	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0
3	0.0	5.0	17.5	91.0	18.2
4	24.9	2.0	47.1	58.8	412.6
5	3.9	24.7	19.6	60.4	52.1
6	24.5	65.3	140.2	20.3	25.0
7	27.5	6.8	203.9	158.6	15.2
8	1014.8	5.7	15.4	214.6	141.4
9	16.3	17.7	24.4	14.7	277.4
10	28.8	2.0	48.2	29.0	36.3
11	218.6	38.1	80.0	123.3	198.6
Total	1359.3	167.1	596.1	769.3	1176.8

Table 15. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, White Bay - Notre Dame Bay, fall program.

Stock: WBNDB Season: FALL UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3	3.3	0.3	7.0	0.0	14.0	0.0	0.0	0.0	0.1	0.0	1.3	0.0
4	0.4	1.0	3.4	14.2	2.1	1.5	2.9	15.7	2.2	0.7	4.5	3.0
5	1.5	0.0	3.8	1.6	40.9	1.5	3.9	20.3	3.2	0.4	1.6	7.3
6	1.8	0.4	3.3	4.2	10.2	13.9	3.3	15.1	1.5	0.1	0.4	0.6
7	1.8	0.0	0.0	1.4	1.3	7.6	10.2	2.8	0.8	2.6	0.3	0.2
8	0.1	0.3	0.0	0.2	1.1	0.0	2.6	8.5	0.4	0.7	0.4	0.0
9	0.2	0.0	1.5	0.3	0.3	0.0	0.4	2.9	1.7	0.0	0.5	0.4
10	0.0	0.0	0.0	0.9	0.2	0.0	0.0	2.1	0.4	2.2	0.3	0.2
11	4.3	0.3	0.4	1.9	3.3	2.3	1.3	1.1	1.0	1.7	1.9	1.5
Total	13.3	2.2	19.5	24.7	73.4	26.8	24.6	68.6	11.6	8.4	11.2	13.2

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
2	9.8	4.5	8.5	0.5	23.3	2.6	0.2	1.2	5.7	5.2	3.2	0.3
3	8.1	5.2	29.1	50.1	6.4	134.5	9.0	0.6	3.9	10.8	120.9	5.2
4	204.1	1.2	5.6	81.4	19.1	19.0	107.3	38.8	3.6	20.1	21.1	262.1
5	7.2	25.2	3.5	7.3	84.0	11.6	12.5	352.0	18.0	7.6	7.0	15.8
6	92.2	1.0	1.9	14.1	4.2	60.1	9.0	35.1	90.4	39.2	3.5	2.4
7	2.7	5.3	0.8	19.8	8.5	7.1	38.2	16.0	7.8	123.8	12.1	3.1
8	29.5	0.5	9.3	2.6	14.0	6.7	3.8	57.3	6.6	4.1	51.8	10.3
9	4.5	1.9	0.0	22.4	0.8	7.5	2.6	8.6	13.3	12.2	7.3	32.3
10	34.0	0.8	15.5	5.2	8.5	5.2	3.1	5.5	1.2	25.6	10.8	1.7
11	503.9	83.7	192.6	318.7	254.8	119.5	50.2	102.3	27.0	41.9	33.5	10.3
Total	895.0	129.4	266.8	521.6	424.0	373.5	235.9	616.4	177.9	290.7	270.0	343.5

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
2	9.8	4.5	8.5	0.5	23.3	2.6	0.2	1.2	5.9	5.2	3.2	0.3
3	11.3	5.4	36.1	50.1	20.4	134.5	9.0	0.6	4.0	10.8	122.3	5.2
4	204.5	2.2	9.0	95.5	21.2	20.5	110.2	54.5	5.8	20.8	25.5	265.1
5	8.6	25.2	7.3	8.9	124.8	13.1	16.4	372.3	21.2	8.0	8.6	23.1
6	94.0	1.4	5.2	18.3	14.4	74.0	12.3	50.2	91.9	39.3	3.9	3.0
7	4.5	5.3	0.8	21.2	9.8	14.7	48.4	18.8	8.6	126.4	12.5	3.3
8	29.6	0.8	9.3	2.8	15.1	6.7	6.4	65.8	7.0	4.8	52.3	10.3
9	4.7	1.9	1.5	22.7	1.1	7.5	3.0	11.5	15.1	12.2	7.8	32.7
10	34.0	0.8	15.5	6.1	8.7	5.2	3.1	7.7	1.7	27.8	11.1	1.9
11	508.2	84.0	193.0	320.6	258.1	121.9	51.6	103.4	28.0	43.6	35.4	11.8
Total	908.3	131.6	286.3	546.3	497.4	400.3	260.5	685.0	189.5	299.1	281.2	356.7

Table 16. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, Bonavista Bay - Trinity Bay, spring program.

Stock: BBTB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	2.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	10.2	13.0	0.0	6.6	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.1
5	0.2	0.0	0.0	4.8	0.7	0.6	39.0	0.5	0.0	0.0	0.3	0.3	0.4	5.8
6	0.0	0.0	10.2	2.1	3.1	0.6	6.3	10.9	0.6	0.3	0.2	0.3	0.2	3.2
7	0.0	0.0	29.4	2.4	0.0	0.0	0.0	1.9	0.8	0.4	0.2	1.9	0.9	1.7
8	0.0	0.0	4.7	2.1	0.0	0.6	0.0	1.3	0.2	1.3	0.0	1.3	1.2	1.1
9	0.0	0.0	35.8	0.7	0.7	0.0	0.4	0.0	0.0	0.7	0.5	0.5	1.2	3.4
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	3.3	0.1	1.0
11	0.6	10.2	71.5	1.7	1.4	2.8	2.1	0.7	0.0	0.0	0.3	2.4	7.3	15.0
Total	0.8	10.2	161.4	28.8	5.9	12.1	47.8	15.5	1.6	3.1	1.5	10.1	11.3	31.2

SPRING SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.6	0.3	0.1	0.1	0.0	0.0
3	1.6	2.6	0.0	19.9	3.1	4.4	20.2	18.3	0.9	1.2	5.8	2.3	8.8	1.4
4	15.5	483.5	17.3	4.6	1.4	35.8	8.2	7.6	151.6	1.2	0.3	21.8	8.2	76.3
5	2.5	220.8	0.0	1.7	0.3	1.2	37.7	4.3	2.4	104.5	2.3	0.9	27.7	18.4
6	2.6	14.4	53.1	1.5	1.0	0.0	3.5	11.2	2.6	1.5	30.0	5.5	4.5	42.5
7	13.9	44.4	0.0	5.2	0.0	0.7	0.7	1.0	3.1	0.0	0.5	57.7	12.2	4.9
8	80.2	56.2	3.5	0.0	0.7	0.0	2.2	1.0	0.9	0.0	0.4	0.9	60.8	30.1
9	4.1	331.9	0.0	4.2	0.3	9.8	0.0	1.0	0.3	0.3	0.6	0.6	0.8	94.9
10	10.6	5.2	41.4	5.9	0.3	1.6	2.2	1.1	0.2	0.7	0.0	0.7	3.2	5.7
11	13.9	147.7	575.0	166.7	56.3	181.0	146.4	39.3	10.8	6.4	12.5	5.5	8.9	12.6
Total	145.1	1306.8	690.2	209.4	63.5	233.8	221.8	84.8	174.2	116.0	52.6	96.0	135.1	286.8

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.6	0.3	0.1	0.1	0.0	0.0
3	1.6	2.6	0.0	22.0	3.1	5.5	20.2	18.3	0.9	1.2	5.8	2.3	8.8	1.4
4	15.5	483.5	27.4	17.6	1.4	42.4	8.2	7.6	151.6	1.5	0.3	21.9	8.3	76.4
5	2.7	220.8	0.0	6.5	1.0	1.8	76.7	4.8	2.4	104.5	2.6	1.2	28.1	24.1
6	2.6	14.4	63.3	3.5	4.1	0.6	9.9	22.1	3.2	1.8	30.2	5.8	4.7	45.7
7	13.9	44.4	29.4	7.6	0.0	0.7	0.7	2.9	4.0	0.4	0.7	59.6	13.0	6.5
8	80.2	56.2	8.1	2.1	0.7	0.6	2.2	2.3	1.1	1.3	0.4	2.2	62.0	31.2
9	4.1	331.9	35.8	4.9	1.0	9.8	0.4	1.0	0.3	1.1	1.1	1.1	2.1	98.4
10	10.6	5.2	41.4	5.9	0.3	1.6	2.2	1.2	0.2	0.7	0.0	4.0	3.3	6.7
11	14.5	157.9	646.5	168.4	57.7	183.8	148.5	40.0	10.8	6.4	12.8	7.9	16.2	27.6
Total	145.9	1317	851.6	238.2	69.4	245.9	269.6	100.3	175.8	119.1	54.1	106.1	146.4	318.0

Table 17. Unstandardised research gillnet catch rates at age (numbers per days fished) by spawning type, Bonavista Bay - Trinity Bay, fall program.

Stock: BBTB Season: FALL UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0
3	0.8	0.0	20.3	0.2	0.4	0.4	0.2	0.0	0.1	0.2	0.4	0.0
4	1.2	1.3	3.3	33.6	1.2	0.9	0.7	0.3	0.5	0.2	1.6	1.6
5	0.5	0.2	10.9	8.5	23.3	0.8	2.4	0.7	0.9	0.4	0.5	2.5
6	1.2	0.2	0.4	10.0	5.0	8.8	2.8	0.7	1.1	0.9	0.2	0.4
7	2.5	0.2	1.8	2.3	4.9	3.8	7.7	0.5	0.6	0.8	0.4	0.4
8	0.6	2.4	0.1	1.5	0.5	0.8	2.0	2.8	0.1	0.5	0.2	0.3
9	0.3	0.0	5.3	0.6	1.9	0.3	1.3	0.7	1.3	0.1	0.4	0.4
10	0.0	0.0	0.0	4.4	0.0	0.0	0.1	0.1	0.4	0.8	0.0	0.9
11	2.0	1.2	5.6	4.5	4.4	1.2	1.0	0.6	1.7	0.5	0.5	1.9
Total	9.0	5.5	47.7	65.5	41.6	17.0	18.1	6.5	6.8	4.2	4.2	8.4

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0
2	20.6	1.3	4.6	1.0	18.3	2.2	2.4	3.7	4.9	9.7	1.8	0.9
3	1.3	1.9	73.0	8.1	7.6	50.3	5.8	0.3	14.7	3.0	39.9	2.2
4	12.8	0.2	19.8	101.9	7.4	4.0	109.9	4.4	1.5	10.3	10.2	56.4
5	0.9	0.8	5.0	11.0	57.3	1.8	2.1	43.9	6.3	1.1	8.3	8.1
6	4.3	0.2	14.6	4.3	2.3	8.0	2.2	1.9	50.9	4.2	0.5	14.0
7	0.3	1.6	0.1	11.5	1.3	5.1	4.6	1.7	1.9	20.8	2.9	1.1
8	0.9	0.0	3.0	0.2	2.0	0.1	0.6	1.6	1.6	0.5	13.4	7.5
9	0.1	1.2	0.0	4.5	0.0	0.6	0.1	0.5	1.1	1.0	1.3	33.2
10	1.9	0.1	0.6	1.0	1.9	0.0	0.8	0.2	0.2	1.0	1.2	2.1
11	101.2	61.8	64.8	95.9	44.6	17.6	10.4	6.3	3.9	2.4	4.4	6.9
Total	144.1	69.0	185.2	239.2	142.6	85.1	138.7	64.4	87.6	54.0	84.0	132.4

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0
2	20.6	1.3	4.6	1.0	18.3	2.2	2.4	3.7	5.1	9.7	2.0	0.9
3	2.1	1.9	93.3	8.3	8.0	50.7	6.0	0.3	14.8	3.2	40.2	2.3
4	14.0	1.5	23.1	135.5	8.6	4.9	110.6	4.7	2.0	10.5	11.7	58.0
5	1.4	1.0	15.9	19.5	80.6	2.6	4.5	44.6	7.2	1.5	8.8	10.6
6	5.5	0.4	15.0	14.3	7.3	16.8	5.0	2.7	52.0	5.1	0.7	14.5
7	2.8	1.8	1.9	13.8	6.2	8.9	12.3	2.2	2.5	21.6	3.4	1.5
8	1.5	2.4	3.1	1.7	2.5	0.9	2.6	4.4	1.7	1.0	13.7	7.8
9	0.4	1.2	5.3	5.1	1.9	0.9	1.4	1.2	2.4	1.1	1.6	33.6
10	1.9	0.1	0.6	5.3	1.9	0.0	0.9	0.3	0.6	1.7	1.2	3.0
11	103.1	63.0	70.4	100.4	49.0	18.8	11.4	6.9	5.6	2.9	4.8	8.7
Total	153.1	74.5	232.9	304.7	184.2	102.1	156.8	70.9	94.4	58.2	88.2	140.8

Table 18. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, Conception Bay - Southern Shore, spring program.

Stock: CBSS Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	1.2	0.0	0.0	0.5	0.0
4	0.0	0.9	0.3	1.2	0.0	0.1	2.5	0.6
5	0.0	1.3	4.7	1.4	6.5	0.4	1.7	8.5
6	0.0	26.6	10.3	3.9	12.1	1.5	0.8	1.4
7	0.0	20.8	66.9	6.8	20.3	3.2	0.1	2.7
8	0.0	16.7	20.2	9.3	9.9	5.2	1.6	4.1
9	0.0	3.4	12.5	1.3	20.1	0.6	1.2	5.7
10	0.0	1.9	0.7	2.4	0.1	4.8	0.0	11.4
11	0.0	27.1	29.8	4.3	3.7	1.9	3.8	52.1
Total	0.0	98.9	145.5	31.5	72.7	17.8	12.3	86.2

SPRING SPAWNERS

Age	1980	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
3	0.0	8.4	0.0	19.1	5.9	16.2	19.2	0.0
4	0.0	1.5	121.9	2.5	26.4	25.3	11.7	25.5
5	0.0	6.5	3.3	180.2	22.5	13.9	9.0	8.7
6	0.0	18.6	22.8	8.3	725.2	20.4	1.2	24.7
7	0.9	2.6	5.6	13.7	32.3	110.0	5.6	2.7
8	0.0	2.2	4.3	4.5	69.5	7.4	49.8	9.7
9	0.0	0.5	1.3	3.2	9.8	6.5	1.7	70.3
10	0.9	0.0	1.3	1.3	2.0	1.4	2.4	6.0
11	42.2	130.6	57.6	85.5	84.2	31.1	5.5	14.1
Total	44.0	171.0	217.3	317.9	978.7	232.0	106.3	161.6

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
3	0.0	8.4	0.0	20.2	5.9	16.2	19.7	0.0
4	0.0	2.4	122.2	3.7	26.4	25.4	14.2	26.1
5	0.0	7.8	7.9	181.6	29.0	14.3	10.7	17.2
6	0.0	45.2	33.1	12.1	737.3	21.9	2.0	26.1
7	0.9	23.3	72.6	20.4	52.6	113.2	5.8	5.4
8	0.0	18.9	24.6	13.7	79.4	12.7	51.4	13.7
9	0.0	3.9	13.8	4.4	29.9	7.1	2.9	76.0
10	0.9	1.9	2.0	3.7	2.0	6.2	2.5	17.4
11	42.2	157.7	87.4	89.8	87.9	33.0	9.3	66.1
Total	44.0	269.9	362.8	349.4	1051.4	249.8	118.6	247.8

Table 19. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, Conception Bay - Southern Shore, fall program.

Stock: CBSS Season: FALL UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
2	1.9	0.0	0.0	0.0		0.0	0.4	0.0	0.0
3	0.2	7.3	4.4	0.1		0.1	0.3	0.0	0.1
4	4.6	6.2	12.8	2.4		0.0	0.0	0.1	1.6
5	0.8	213.5	7.5	4.0		0.3	0.3	0.1	5.9
6	1.3	39.5	53.6	2.6		0.2	0.0	0.0	2.8
7	0.1	10.4	16.6	9.2		0.7	0.2	0.0	2.2
8	0.1	1.1	11.0	4.1		0.6	0.1	0.3	0.4
9	1.1	1.7	0.0	2.1		5.4	0.0	0.2	1.3
10	0.0	1.1	0.1	1.1		1.1	0.3	0.0	1.2
11	0.7	1.4	6.4	0.5		0.4	0.2	0.1	1.5
Total	10.7	282.0	112.4	26.1		8.8	2.0	0.8	16.9

SPRING SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	1.5		0.0	0.0	0.0	0.0
2	2.3	80.0	1.1	0.9		14.3	41.7	0.1	0.2
3	1.2	18.7	461.0	0.4		118.2	6.3	2.1	0.8
4	2.1	68.0	26.0	34.9		4.2	12.2	0.5	17.1
5	0.2	130.2	14.7	2.3		6.5	0.6	4.3	7.8
6	0.3	8.7	18.1	2.4		295.6	0.7	0.3	23.1
7	0.3	7.0	0.1	1.6		8.8	11.8	0.3	0.4
8	0.0	13.3	1.1	0.2		10.6	0.4	6.6	0.6
9	0.3	0.0	1.1	0.5		0.9	0.3	0.6	30.8
10	0.3	0.0	0.0	0.6		0.0	0.7	0.8	3.0
11	7.3	88.7	41.8	3.0		2.8	0.9	0.3	9.2
Total	14.3	414.5	565.0	48.3		461.8	75.6	16.0	93.0

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	1.5		0.0	0.0	0.0	0.0
2	4.2	80.0	1.1	0.9		14.3	42.2	0.1	0.2
3	1.4	26.0	465.4	0.5		118.3	6.7	2.1	0.9
4	6.7	74.2	38.8	37.3		4.2	12.2	0.7	18.7
5	1.0	343.6	22.2	6.3		6.8	0.9	4.4	13.7
6	1.6	48.2	71.7	5.0		295.8	0.7	0.3	25.9
7	0.4	17.5	16.7	10.8		9.5	12.0	0.3	2.5
8	0.1	14.4	12.1	4.3		11.2	0.5	6.9	1.0
9	1.4	1.7	1.1	2.6		6.3	0.3	0.8	32.0
10	0.3	1.1	0.1	1.7		1.1	1.0	0.8	4.1
11	8.0	90.1	48.2	3.5		3.2	1.1	0.4	10.7
Total	25.0	696.5	677.4	74.4		470.6	77.6	16.8	109.9

Table 20. Unstandardized research gillnet catch rates at age (numbers per days fished) by spawning type, St. Mary's Bay - Placentia Bay, spring program.

Stock: SMBPB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.6	0.5	6.2	0.9	0.7	2.0	0.0	0.1	0.1	0.4
4	0.9	8.4	0.2	0.6	10.3	10.8	36.8	8.0	4.6	1.1	1.8	1.0	3.0
5	23.0	0.6	0.0	2.0	1.9	53.2	14.2	16.6	8.2	1.2	3.8	4.5	10.5
6	1.3	28.3	1.2	0.2	5.3	15.9	39.0	10.2	14.9	2.9	1.5	2.8	3.0
7	29.4	10.9	1.4	0.0	1.0	22.8	14.4	42.2	8.5	5.2	3.8	2.9	1.2
8	58.7	9.5	4.8	0.2	0.5	1.5	12.2	10.4	20.6	5.0	2.8	3.3	3.0
9	20.3	17.4	0.0	0.1	0.8	4.1	1.5	3.6	7.5	8.3	2.0	6.7	1.9
10	9.1	6.9	0.3	0.0	0.4	0.8	2.5	1.5	0.7	1.2	5.0	2.0	1.2
11	40.0	43.2	21.9	0.5	2.6	13.5	10.9	4.5	4.6	4.4	4.3	29.7	7.8
Total	182.7	125.2	29.9	4.1	23.2	128.6	132.5	97.8	71.5	29.2	24.9	52.9	32.1

SPRING SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.2	1.8	0.7	0.0	0.0	0.0	0.4	0.2	0.1	0.1
3	6.7	230.3	0.6	0.2	11.3	18.5	59.2	0.3	13.7	2.3	23.5	11.2	1.2
4	627.5	35.0	0.0	0.6	2.0	21.7	5.9	125.6	1.7	4.2	6.0	19.5	21.5
5	71.5	420.5	243.1	0.4	1.0	6.9	9.9	8.5	151.9	2.7	1.8	5.7	9.3
6	56.7	37.0	4.8	1.4	1.1	2.7	6.9	17.4	11.6	100.3	3.5	2.4	2.5
7	278.0	178.9	39.9	0.2	3.5	0.9	2.4	3.5	17.7	6.2	64.3	5.0	0.7
8	87.7	33.9	0.3	1.7	0.4	7.3	2.1	2.6	4.0	14.4	3.3	69.9	1.4
9	18.9	13.4	1.2	0.4	5.2	0.2	8.6	0.1	2.1	3.0	12.6	2.4	10.8
10	62.1	15.4	8.2	0.4	0.6	10.1	2.7	2.4	0.6	0.1	3.1	16.7	1.4
11	139.0	64.8	4.8	6.5	21.5	46.7	45.4	12.1	7.4	7.2	4.9	6.8	6.3
Total	1349.4	1028.1	302.4	11.9	48.4	115.6	143.1	172.5	210.4	140.9	123.3	139.5	55.1

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.2	1.8	0.7	0.0	0.0	0.0	0.4	0.2	0.1	0.1
3	6.7	230.3	0.6	0.8	11.8	24.7	60.2	1.0	15.7	2.3	23.6	11.3	1.5
4	628.4	43.3	0.2	1.2	12.3	32.5	42.7	133.6	6.3	5.3	7.8	20.5	24.5
5	94.5	421.1	243.1	2.3	2.9	60.2	24.1	25.1	160.1	3.9	5.6	10.2	19.8
6	58.0	65.3	6.1	1.6	6.4	18.6	45.8	27.6	26.4	103.2	4.9	5.1	5.6
7	307.4	189.8	41.4	0.2	4.5	23.7	16.9	45.7	26.2	11.4	68.1	7.9	1.8
8	146.4	43.4	5.1	1.9	0.9	8.8	14.3	13.0	24.6	19.4	6.1	73.2	4.5
9	39.2	30.8	1.2	0.5	6.0	4.3	10.0	3.7	9.6	11.2	14.6	9.0	12.7
10	71.2	22.3	8.5	0.4	1.0	10.8	5.2	3.9	1.3	1.3	8.0	18.7	2.6
11	179.0	108.0	26.8	7.0	24.1	60.2	56.2	16.6	11.9	11.6	9.2	36.5	14.1
Total	1532.1	1153.3	332.3	16.0	71.6	244.2	275.6	270.3	281.9	170.1	148.2	192.4	87.2

Table 21. Unstandardised research gillnet catch rates at age (numbers per days fished) by spawning type, Fortune Bay, spring program.

Stock: FB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	7.5	2.2	0.0
4	0.0	0.0	0.3	18.0	0.0	13.9	8.5	0.1	0.2	0.2	6.6	2.5
5	0.0	0.0	1.4	6.0	27.5	7.9	5.0	3.3	0.1	3.7	1.0	5.8
6	0.0	2.1	0.2	20.6	10.5	74.2	9.3	4.0	3.0	1.4	2.0	2.2
7	0.0	4.2	0.0	2.0	17.3	38.7	28.3	4.5	3.8	11.2	1.4	1.6
8	8.2	1.4	0.0	1.1	3.6	17.5	9.0	25.6	3.0	8.9	4.7	1.8
9	2.8	14.1	0.0	0.5	0.9	13.9	2.0	10.0	12.1	3.1	9.4	2.1
10	0.0	2.1	0.0	0.0	0.2	3.3	1.0	5.2	1.1	20.8	0.5	7.2
11	6.8	12.7	0.1	0.7	3.1	6.0	1.7	17.3	13.8	24.8	19.6	24.2
Total	17.8	36.7	2.0	48.9	63.0	175.3	64.9	69.9	37.2	81.4	47.4	47.7

SPRING SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
3	0.0	10.4	0.6	8.4	0.0	14.4	0.0	0.0	0.0	12.2	98.8	0.7
4	122.4	13.8	0.8	6.0	19.6	2.8	224.5	0.0	0.0	0.9	1.4	71.2
5	5.6	168.3	0.6	3.9	13.2	205.4	8.8	532.1	3.1	0.9	0.0	22.0
6	16.7	15.2	0.1	3.1	5.4	69.5	70.0	11.7	419.7	15.9	0.0	2.9
7	236.5	31.5	0.2	2.4	1.2	15.8	48.4	48.3	9.8	664.7	6.2	2.2
8	2.8	86.4	6.0	2.7	3.6	4.6	10.0	20.7	50.5	15.0	236.8	28.6
9	5.6	0.0	0.3	44.0	0.3	8.8	0.8	4.8	11.3	65.4	19.7	371.2
10	0.0	6.2	0.8	4.6	3.9	6.5	2.0	1.4	2.1	33.7	59.0	49.9
11	8.3	13.8	0.8	53.7	90.6	135.8	36.0	71.8	19.6	125.3	56.1	184.9
Total	397.5	345.6	10.3	128.7	137.9	463.6	400.1	690.2	515.6	934.9	479.4	733.5

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
3	0.0	10.4	0.6	8.4	0.0	14.5	0.0	0.0	0.0	19.6	101.0	0.7
4	122.4	13.8	1.1	24.0	19.6	16.6	233.0	0.1	0.2	1.1	8.1	73.7
5	5.6	168.3	2.0	9.9	40.7	213.2	13.8	535.4	3.2	4.6	1.0	27.8
6	16.7	17.3	0.3	23.7	15.8	143.7	79.3	15.7	422.7	17.3	2.0	5.2
7	236.5	35.6	0.2	4.5	18.5	54.5	76.7	52.8	13.6	675.9	7.6	3.8
8	11.0	87.8	6.0	3.8	7.2	22.2	19.0	46.3	53.5	23.8	241.5	30.4
9	8.3	14.1	0.3	44.5	1.2	22.7	2.8	14.8	23.5	68.5	29.0	373.3
10	0.0	8.3	0.8	4.6	4.1	9.8	3.0	6.6	3.2	54.4	59.4	57.1
11	15.2	26.5	0.9	54.4	93.7	141.8	37.7	89.1	33.4	150.1	75.7	209.0
Total	415.3	382.3	12.3	177.6	200.9	638.9	465.0	760.1	552.8	1016.3	526.8	781.2

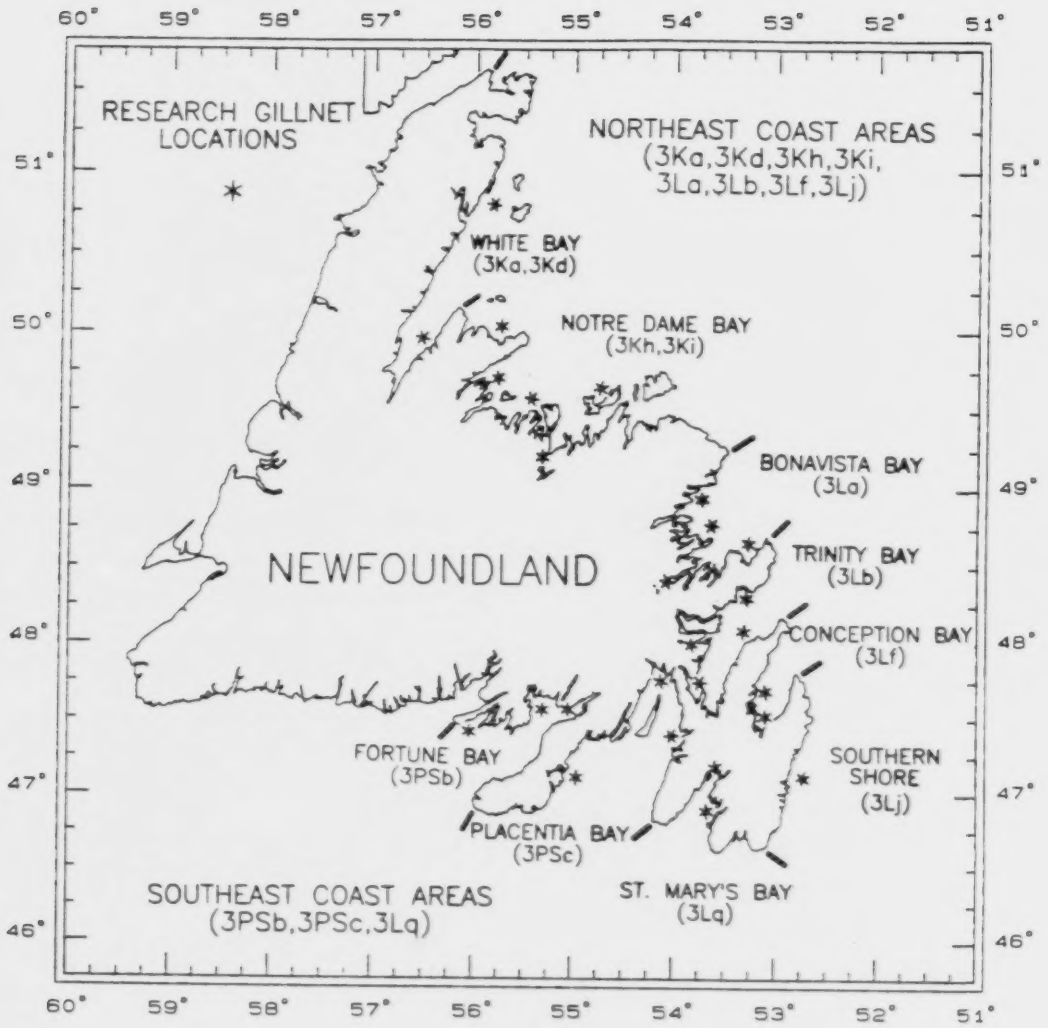

Fig. 1. Area map indicating herring stock complexes and research gillnet locations within the Newfoundland region.

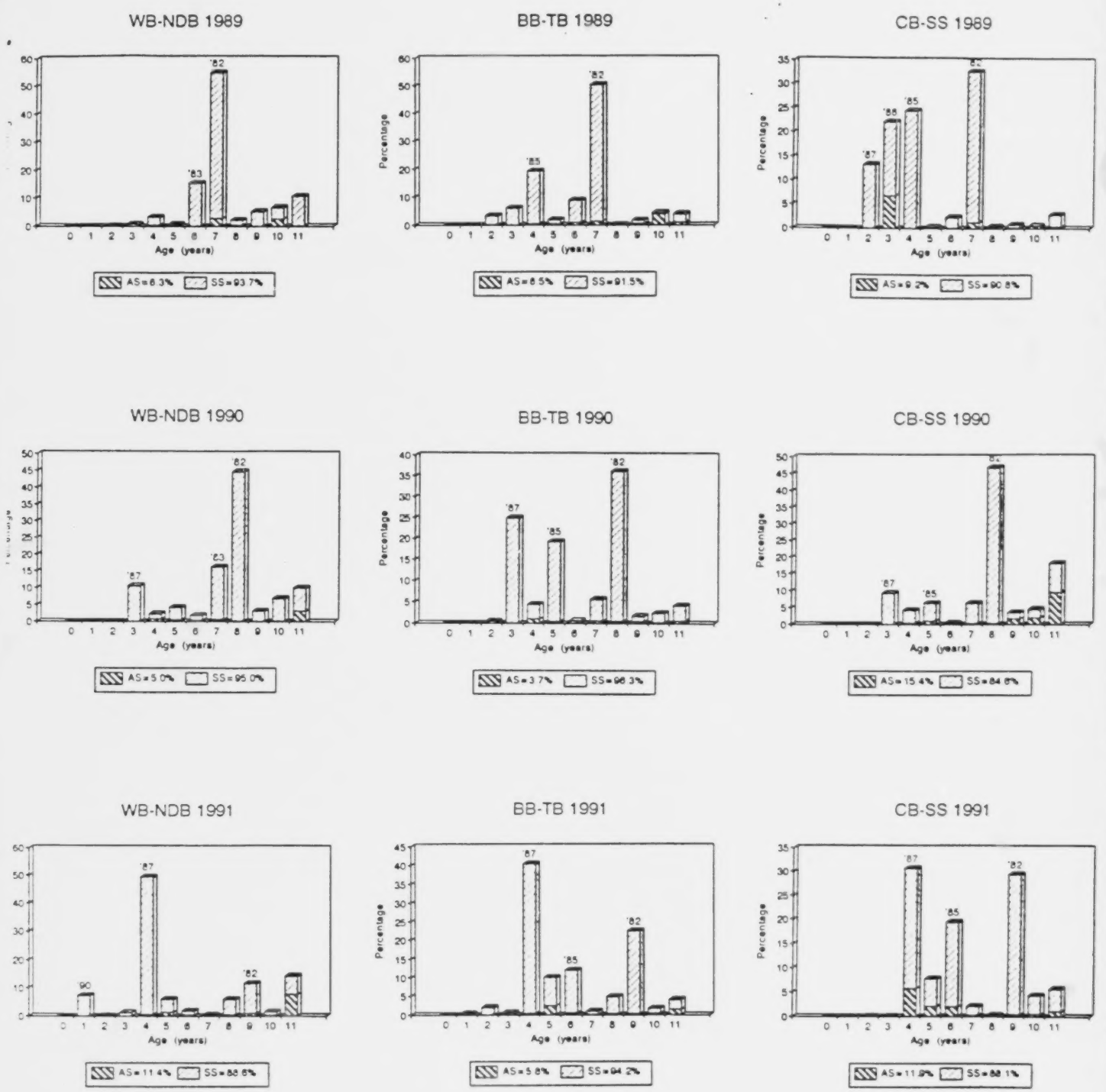

Fig. 2. Age distribution of herring from the commercial fishery, White Bay - Notre Dame Bay, Bonavista Bay - Trinity Bay, and Conception Bay - Southern Shore, 1989 -1991.

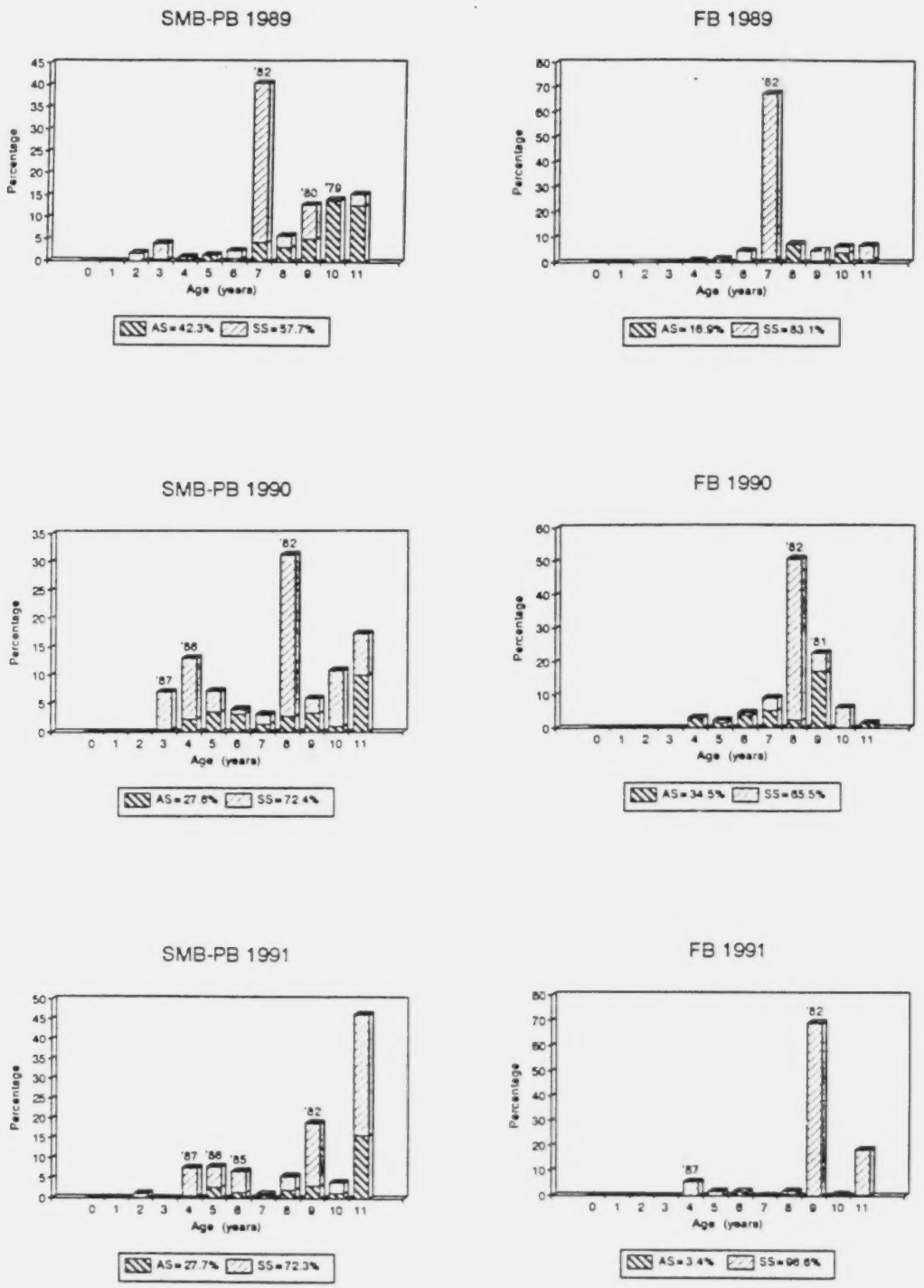

Fig. 3. Age distribution of herring from the commercial fishery, St. Mary's Bay - Placentia Bay, and Fortune Bay, 1989 -1991.

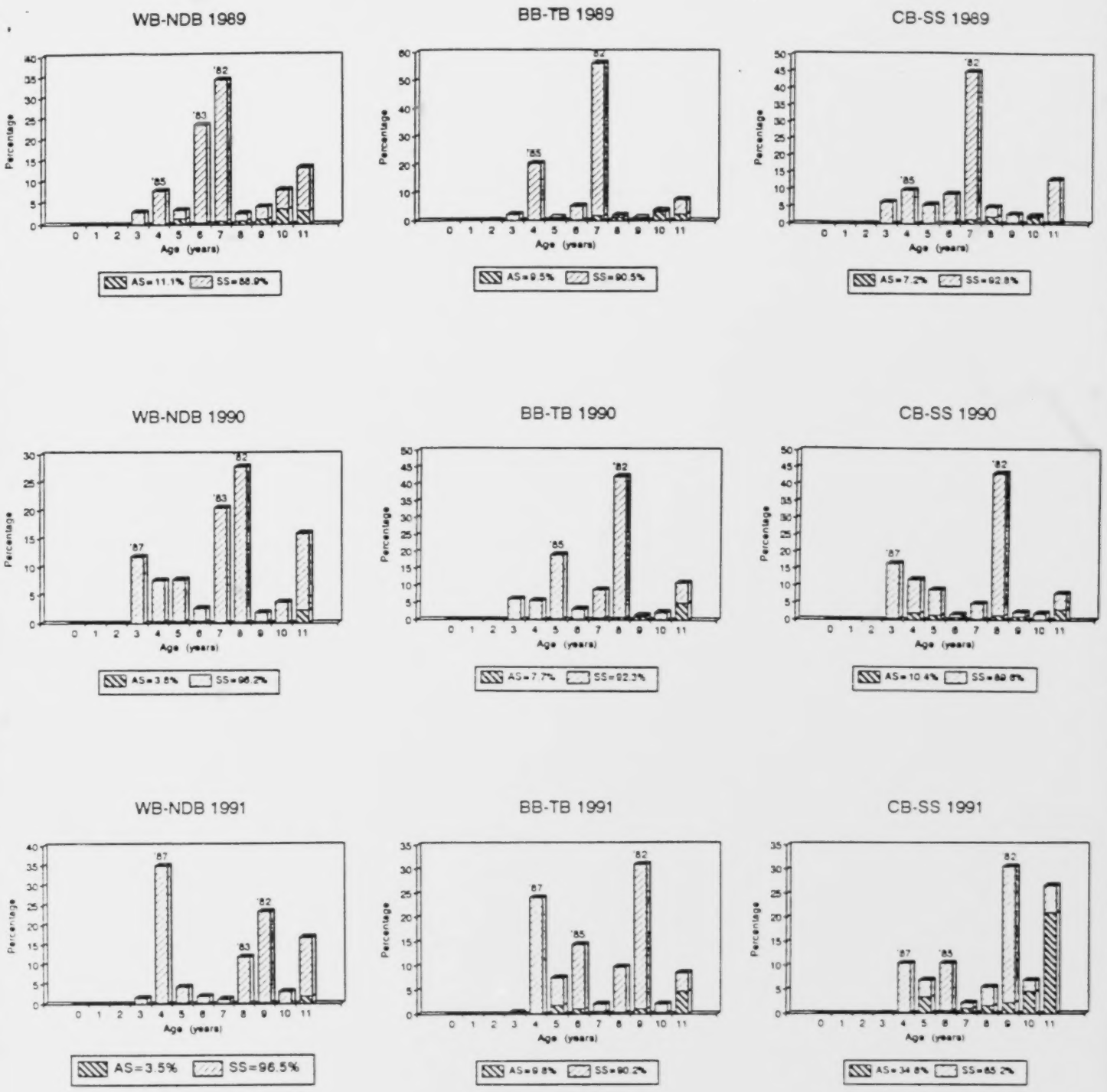

Fig. 4. Age distribution of herring from research gillnets, White Bay - Notre Dame Bay, Bonavista Bay - Trinity Bay, and Conception Bay - Southern Shore, 1989 - 91, spring program only.

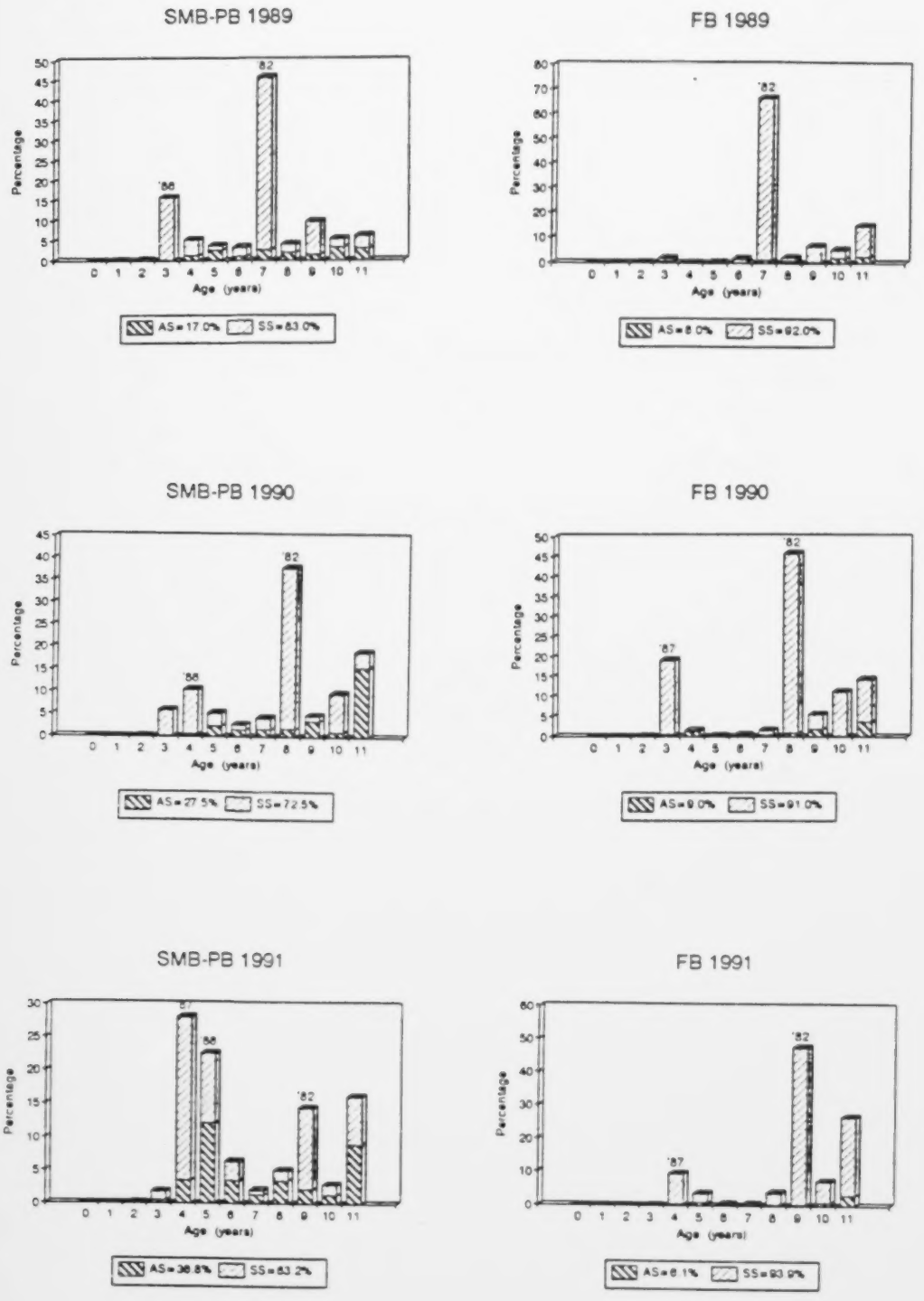

Fig. 5. Age distribution of herring from research gillnets, St. Mary's Bay - Placentia Bay, and Fortune Bay, 1989 - 91, spring program only.

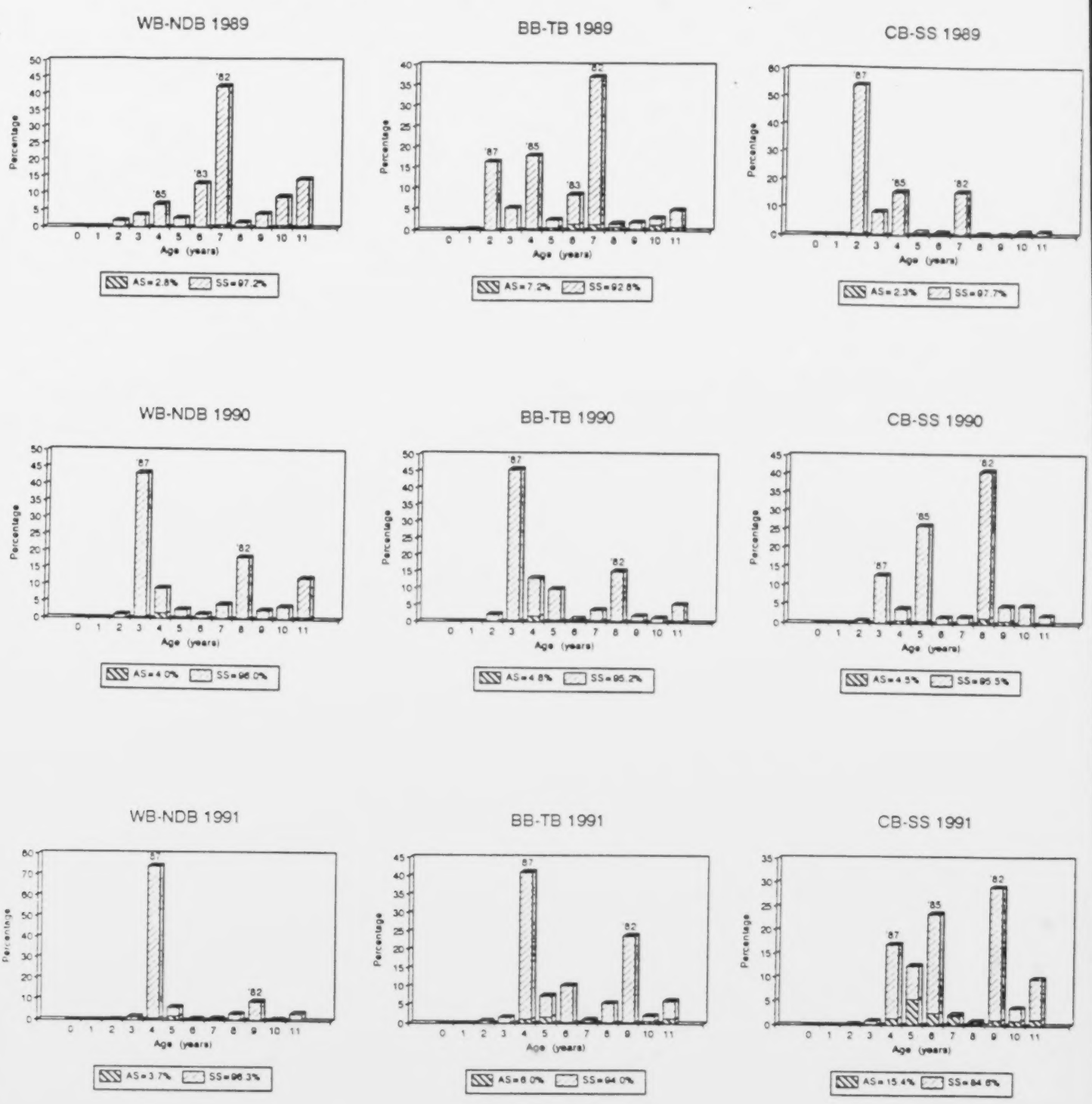

Fig. 6. Age distribution of herring from research gillnets, White Bay - Notre Dame Bay, Bonavista Bay - Trinity Bay, and Conception Bay - Southern Shore, 1989 -91, fall program only.